THE
RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
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CONTENTS

DIESEL RAILWAY TRACTION SUPPLEMENT

The February issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, is now ready, price* 1s.

GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export

DISPATCH OF "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE *possesses the necessary permit and machinery for such dispatch, and any reader desirous of arranging for copies to be delivered to an agent or correspondent overseas should place the order with us together with the necessary delivery instructions.*

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas, as they are stopped under the provisions of Statutory Rules & Orders No. 1190 *of* 1940, *and No.* 359 *of* 1941

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

TO CALLERS AND TELEPHONERS

Until further notice our office hours are:
Mondays to Fridays 9.30 *a.m. till* 5.0 *p.m.*
The office is closed on Saturdays

The Ministerial Changes

AFTER we had closed for press last week the changes in the Government, necessitated by the fulfilment of the Prime Minister's undertaking to create an office in this country similar to that of Mr. Donald Nelson in the United States, were announced. As had been generally expected Lord Beaverbrook is charged with responsibility for the new Ministry of War Production, an office which will afford scope for his undoubted energy and drive. Sir Andrew Duncan is to leave the Board of Trade and return to the Ministry of Supply. At this stage of his parliamentary life he should be equally at home in either department, but there can be little doubt that in coming months the more important tasks will present themselves to him in the office he assumes. Colonel J. J. Llewellin leaves the Ministry of War Transport, where he has been Joint Parliamentary Secretary, to take over the Presidency of the Board of Trade. His is the most notable promotion involved in the changes and is well earned by the industrious application for which he has been known not only since the Ministry was created, but previously for a while with the Ministry of Transport. He is succeeded at the Ministry of War Transport by Mr. Philip J. Noel Baker.

An Outstanding German Civil Engineer

On February 8 the Official German News Agency announced the death "in an air crash while on military duty" of Dr. Fritz Todt, the most outstanding civil engineer produced by the Nazi regime in Germany, and, by reason of his transport achievements, one of our most dangerous enemies. Dr. Todt, who held the rank of Major-General, was born at Pforzheim in Baden in 1891. He studied engineering in Munich and Karlsruhe, and specialised in road construction. As early as 1922 he joined the Nazi party, and became imbued with a belief in Hitler's mission. When Hitler became Chancellor, Todt was appointed Inspector General of German Roads, and the *Reichsautobahnen* are the direct achievement of his technical and strategical abilities and organising genius. He designed and constructed the German West Wall or Siegfried Line. He created the Todt Organisation which supplied the Army on all fronts, and built the East Wall (along the German-Russian line of demarcation in Poland), the "Atlantic fortifications," and military roads in Eastern Europe and the Balkans. In 1940 he was appointed also Minister of Armaments & Munitions.

Unsought Traffic

The vital necessity of obtaining the maximum use of wagons by taking all steps to eliminate delay in loading and unloading has been stressed frequently and strongly by the railways and by the Ministry of War Transport during the present war. It is obviously essential, in view of the calls which are made on rolling stock in these abnormal times, that the maximum useful mileage should be achieved. One factor which mitigates against obtaining this maximum usage, which is very prevalent in the United States and is not unknown in this country, is to be found in the abuse of empty wagons by receivers of freight who fail to clean out waste. This has been a lively topic of discussion recently in the United States, where it is pointed out that in effect the railways are put into the refuse business, and that not only are they involved in expense, but, more important, the practice involves needless detention of wagons from their useful employment. Consignors who fail to clean out normal rubbish from wagons are inconsiderate enough, but much more so is the small minority who use the empty wagons as a receptacle for the accumulated waste of their warehouses, leaving the railway to cart it away. A recent investigation in America brought to light in one week a batch of 287 coal wagons, each of which contained from 200 lb. to 4,000 lb. of refuse when turned over as empty to one railway; the time taken in cleaning these wagons amounted to no less than 450 wagon-days.

The Effect of Staggered Hours

One of the major difficulties of urban and suburban travel, even in peacetime, is the fact that transport undertakings

have no control over the hours at which passengers travel to and from work, and the wartime intensification of this peak traffic is such that widespread efforts have been made to flatten the peak, and so make better use of available transport. This staggering of working hours has been begun as an emergency measure in wartime, but its advantages may well give the arrangement a welcome permanence. When peak hour difficulties were intensified by the blackout in the 1939-40 winter, and increased by the blackout plus heavy air raiding in the 1940-41 winter, it was fortunate that an emergency plan was ready for application in London, but it was evident that far reaching changes would have to be made to keep traffic flowing more evenly, and not least in the areas where transport demands have been increased by the greater activity of war industry. Already an important advance has been made. Whereas last winter the more pressing needs of war transport were met by improvisation, this winter a plan of staggering hours of work is well advanced in the London area. This week we quote from *The Times* some interesting details of the effect of staggered working hours on the part of one East London group. The achievement is one for which industry and transport share the credit.

L.N.E.R. Traffic Regulating Office

The climatic difficulties of the winter months, such as short days, snow, and occasional fog, are apt to upset the best laid schemes of the railway operator, who has to exercise all his ingenuity if he is to avoid unmanageable accumulations of traffic. The problem is to avoid congestion, for once yards and relief lines become blocked, main-line working is bound to suffer. An interesting and important step which has been taken recently by the L.N.E.R. to meet such difficulties is recorded in the *L.N.E.R. Magazine*. In order to keep the flow of traffic as even as possible, a Traffic Regulation Office was established in October last and now settles the order of priority of the movement of freight. The office is an all-line organisation, staffed by railwaymen who understand the working of the three Areas of the L.N.E.R. and can bring a fund of knowledge to bear on the movement of traffic between different districts. The Traffic Regulating Officer thus has at his beck and call the assistance which he requires in deciding the extent to which restrictions on the acceptance and despatch of traffic are necessary. There are already signs that the existence of a central authority to deal with these questions will be valuable in times of pressure on the company's resources.

Unusual South American Gauge Conversion

Difficulties occasioned by breaks of railway gauge have received considerable prominence recently as a result of the war in eastern Europe. Not only have rapid gauge conversions from 4 ft. 8½ in. to 5 ft., and *vice versa*, been reported from Russia, Poland, and neighbouring territories, but the limitations of the gauges in use in Syria, Iraq, and so forth, have received attention in the popular press. Wartime gauge conversions at least have the advantage of being carried out without regard to financial cost or commercial convenience, but both these considerations are of great importance with conversions contemplated to serve ordinary industrial needs. This week (at page 222) our correspondent in Brazil records the recent conversion from the 60 cm. (2 ft.) to metre gauge of the San Paulo & Minas Railway, a comparatively small system of but 112 miles in length, occupying a strategic position, however, as a cut-off. The gauge conversion has not been rapid, but is stated to have been effected with efficiency and economy. Instead of using a third rail, the work was carried out step by step. Metre-gauge sleepers were first introduced, cuttings and culverts were then widened, and finally the two existing rails were moved further apart. There was no interruption to passenger traffic, for passengers were transhipped at whatever point the conversion had reached. Goods were transhipped, however, only at stations, so that after one lot of mechandise had been handled, goods traffic was held up until widening operations reached the next station.

G.W.R. Third Class Comfort

The comfort or otherwise of a long railway journey—even a short one if the traveller is already tired—is materially affected by the design of the seating provided. It is with pleasure that we illustrate on page 239 the latest design of Great Western Railway third class compartment seating in which it will be noticed that, not only are the seats well sprung, but they are so shaped as to give good support to the small of the back, so that a passenger can at once settle down in a comfortable attitude. The seats themselves are well canted and just about the right height from the floor to accommodate what may be assumed as an average passenger. There would be few for whom the height was too great, and the long-legged are never so uncomfortable on a low seat as the shorter person on a high seat. Comfort has been carefully studied in every aspect of this new G.W.R. standard third class compartment. The windows are large, and low enough to afford an unstrained view outside. The top sliding lights, with their draught excluders, are sufficiently large for suit cases to be handed in and out. The general design is simple, economical, and pleasant, and the colour scheme, with a greenish moquette upholstery and attractive pictures on a cream background above, gives the finishing touches. The photograph we reproduce does not show the black border on the windows, now necessary when a white light is provided inside the compartment during blackout hours, but this is a disadvantage which is unavoidable in present circumstances. It may be added that excellent white lighting is supplied in these compartments at night when the blinds are drawn.

Snow Clearance by Buses

One of the many interesting arrangements made by highway authorities to effect the rapid clearance of snow from roads is that of using the services of local motorbuses. Various of the large railway-associated bus companies are parties to such agreements, and typical arrangements are those which have been effected by the Cheshire County Council with the Crosville Motor Services Limited and the North Western Road Car Co. Ltd. These arrangements provide for the operation of three snow ploughs supplied to each company by the Cheshire County Council. As necessary, the ploughs are fitted to buses and used primarily for keeping open the main bus routes, particularly those leading to works and factories engaged on war production. The agreement with the bus companies provides for the payment of vehicles at the rate of 7s. 6d. an hour; the companies provide a driver, and the County Council any additional labour required. Although the County Council supplies the snow ploughs, which are of a single blade type, they are being kept at the depots of the bus companies. In Cheshire there is no arrangement for the attachment of ploughs to buses operating on fare-paying journeys, but under a similar agreement which has been made between the Warwick County Council and the Birmingham & Midland Motor Omnibus Co. Ltd., no charge is made if a plough is attached to a bus which is undertaking a fare-paying service. For vehicles out of service the Warwick agreement is also at the rate of 7s. 6d. an hour.

Turntables in India

Until the advent of the Mundt and Voghele and other types of articulated turntable, the balanced form of deck type table, rotating on a central pivot, was almost universal in India. This pattern of table rests, and with the locomotive on it, balances on the central pivot. There is, however, bound to be a tilt to one or other side, and this is taken care of by one wheel at each of the four corners running on a circular race. When the standard types of Pacific locomotive were introduced in 1928, 85-ft. diameter tables were installed at some engine-changing stations. These are of the balanced type and have ball-bearing pivots and race wheels. But the older tables, varying from 45-ft. to 60-ft., installed between 1885 and 1915, are not fitted with ball bearings. Some of these turntables have recently been lengthened to accommodate longer and heavier engines by the insertion of

additional plates in the girders in the centres of the spans, and, at the same time, have been modified in respect of the pivots, race-wheels, locking pockets and wedges, and the structural steelwork of the tables themselves so as to make manual turning easier, and to facilitate maintenance. These modifications are the subject of an article on page 236 of this issue.

The Sleeper Problem in Wartime

With imports either unobtainable or severely reduced in the interests of shipping space, and with a limited amount of indigenous timber available, British railways are now for the first time facing a serious shortage of wooden sleepers. The many years of financial stringency which preceded the war have also adversely affected the position, for a smaller percentage of good second-hand sleepers is being recovered from relaying than formerly, and this of course means fewer for secondary lines and sidings. Concrete sleepers of various designs are now being used fairly extensively for sidings and slow running lines, and there would seem to be scope for greater use of old wooden sleepers which are unevenly worn or decayed. An article on page 230 of the present issue, which describes a number of devices and discusses methods of prolonging the lives of wooden sleepers when deterioration from various causes has set in, is worth study in this connection.

Railway Clocks

In reading official accident reports it is impossible to avoid noticing how often discrepancies between signal box clocks are mentioned, producing on occasion an appreciable difference between adjacent signal boxes, and adding to the difficulty of conducting an inquiry. As much as five minutes difference has sometimes been reported, a large amount. We cannot help feeling that much greater accuracy than appears in many cases to obtain ought to be aimed at, and that it could be achieved in these days of electrical time systems and wireless time signals several times daily. To some extent the same remarks apply to station clocks. At some large centres, of course, where electrical control is in use, the clocks are all that can be desired, but we feel that an extension of this working is called for and that accurate timepieces throughout the railway is the object to be aimed at, and one surely attainable in these days, when members of the public often have better time than the stations. Surely the electrical synchronisation of signal box clocks, say at three hourly intervals, ought not to present much technical difficulty nowadays. Improvement is certainly called for after the war.

From Coal to Oil Burning

Some 4-8-2 light passenger locomotives have been rebuilt by the Missouri Pacific Railway, and the most interesting feature of the conversion is the change-over from coal to oil burning. One of the engines is illustrated on page 240 of this issue and some particulars are given of the alterations made in the general arrangement and proportions that have been carried into effect. It has often been somewhat jokingly asserted that in most of the heavy rebuilds in this country little of the original engine remains but the wheel centres, but this cannot be said of the American locomotives to which we refer, for they have had their original spoked coupled wheels replaced by others of the Baldwin disc pattern, and in other directions the rebuilding operation has been fairly drastic. As often happens in these cases there has been a drop in the tractive effort figures together with an increase in weight and at first sight one might expect the reverse, as the boiler pressure has been raised. Investigation of the data and dimensions afforded, however, discloses that the diameter of the cylinders has been reduced by lining up and that of the coupled wheels has been increased. The performance of the engines on the road has shown that since being converted there has been a notable increase in availability and mileage which has justified the expense incurred in rebuilding them.

American Railways in 1941

AMERICAN railways ended 1941 with the record of having handled without delay the greatest volume of freight traffic in history, according to Mr. J. J. Pelley, President of the Association of American Railroads. Moreover, the railways are confident of their ability to meet transport demands in 1942 if materials for adequate maintenance and new construction are made available. Continuous improvement in wagons, locomotives, and operating methods, and efficiency enabled the carriers to come through 1941 without a shortage of equipment in spite of the task imposed on them. Among the outstanding records indicating the progress in the past two decades may be mentioned the following: the average load of freight per train was 915 tons in 1941, a new record and an increase of 40·6 per cent. on 1921. Performance per train-hour more than doubled, gross ton-miles per freight train hour increasing from 16,555 in 1921 to 34,814 in 1941. For each 1 lb. of fuel consumed in freight service, the railways hauled 9·2 tons of freight and equipment one mile against 6·2 tons in 1921. The average daily movement of freight wagons established a new high record and exceeded the average of 20 years ago by 45 per cent. The capacity per freight wagon averaged 50·4 tons, the highest ever reached, and exceeded that of 20 years ago by 18·6 per cent.

Passenger traffic was greater than in any year since 1929, and amounted to 29,000,000,000 passenger-miles, an increase of 22·1 per cent. on the preceding year. In 1941 the railways installed about 80,000 new freight wagons and about 600 new locomotives, and they entered the new year with 75,000 freight wagons and 600 locomotives on order. In 1941 railway taxes were the highest in history; these aggregated $550,000,000 compared with the previous high record of $396,700,000 in 1929. Based on incomplete returns, Class I railways will have a net railway operating income before fixed charges of $980,000,000, a return of 3·72 per cent. on property investment and the first time since 1930 that more than 3 per cent. has been earned. Capital expenditure in 1941 reached an estimated $600,000,000 compared with $429,147,000 in 1940.

Symbolic Classification of Locomotives

STEAM locomotives, as distinct from those moved by internal-combustion engines or electricity, have an individuality of their own, and are thus not readily susceptible to classification by symbols in such a way as to convey a precise idea of their capabilities to those unfamiliar with them personally. In publishing Mr. Ashley Brown's suggestion for a system of steam locomotive classification by symbols (page 233), it seems desirable to stress this point. With characteristic individuality the British railways have never made any serious attempt at an elaborate symbolic classification of their steam locomotives, and probably the most useful general system at the present time is that of the L.M.S.R., which divides roughly into power classifications for passenger and freight service. Thus, the least powerful are of classes " 1P " and " 1F," and the most powerful to date are " 7P " (Pacific type) and " 8F " (2-8-0). This may guide the operating man to the extent of preventing his allocation of a " 3P " 4-6-0 to work a heavy express which could not be run to time with anything less than a " 6P " of the same wheel arrangement. The risk of a more elaborate system, such as that outlined by Mr. Ashley Brown, is that the operating man from his remote control post may be tempted to assume that he has from the symbols before him all the knowledge necessary to be certain about the class of locomotive required for any particular duty. For example, he might detail an L.N.E.R. " K4 " 2-6-0 for so hard a duty that a " K3 " 2-6-0, or even an " A1 " Pacific, would be required, and who could say he would not be justified from the symbolic classification ?

That is one of the great dangers of remote control by means of statistics. Anything that discourages the delegation of authority downwards to the man on the spot, placing on his shoulders the responsibility commensurate with his authority, inevitably tends to weaken initiative and reduce efficiency. This is not mere opinion, and could be backed by evidence. The Germans, for example, are not famous as a people for

their initiative, and this may be partly the result of, and partly the reason for, the control to which they as individuals are, and have for long, been subjected. The Reichsbahn has a very elaborate system of locomotive classification represented by letters and numbers on every locomotive. So far as we know, this system works well in Germany. In Great Britain a locomotive may vary from high to comparatively low efficiency according to many circumstances known to the man on the spot but not revealed to the remote Controller, who may thus be seriously misled by reliance on symbols, the elaboration of which may induce in him an unjustifiable confidence. We will conclude by repeating our belief that decentralisation and reliance upon local initiative, and a sense of responsibility, are important features to preserve amongst a people like our own, where individuality is more widely developed probably than anywhere else in the world. Any system of symbolic classification, however ingenious, should never be allowed to stand in the way of the fullest possible exercise of this genius of the British people.

LETTERS TO THE EDITOR

(*The Editor is not responsible for the opinions of correspondents*)

Destroying Records: Losses to Knowledge

February 6, 1942

To the Editor of The Railway Gazette

Sir,—We think it right to call attention to the great national loss which to our knowledge is resulting from the indiscriminate destruction of records, a loss which, thanks to a laudable desire to meet immediate needs for waste paper and a carefully fostered spirit of local competition, threatens to become even more grave. What we have to propose will not to any appreciable extent delay or diminish the flow of material for pulping. But the records of local and ecclesiastical authorities, of semi-public or private institutions, and of business houses, families, and individuals in this country have been described in the past as incomparable in their richness and continuity. They are a national asset. We seem likely at present to destroy unnecessarily and in mere ignorance much of what our ancestors had preserved for us. There is a very real danger that historians and economists of the future may have to lament gaps in their evidence for the eighteenth and nineteenth centuries, and even for earlier periods, which need not have occurred and which nothing can fill.

The points which we wish to bring home to every authority and to every individual concerned in the present drive for waste paper are briefly these:—

The paper dealt with should be regarded as forming two great classes: on the other hand the records of business and social life, public or private, generally in the form of manuscript correspondence, minutes, accounts, etc.; on the other, printed matter of nearly all kinds and all other varieties of used paper.

The difference between these is that the records are by their nature practically always unique: in destroying them irreplaceable knowledge is destroyed. Whereas in destroying the other class the only risk is, as a rule, the destruction of property—serious, perhaps, but not irremediable. This does not mean that we wish to preserve all records: on the contrary, we would probably approve the destruction of all but a small proportion of what most owners would be prepared to destroy.

The task of deciding what may be destroyed is not usually difficult, and there is an organisation which is prepared to help, either itself or through its agents all over the country, those who are in difficulties. All we ask is that destruction should not be indiscriminate.

The British Records Association (whose secretaries may be addressed at the Public Record Office, Chancery Lane, W.C.2) is prepared to answer any questions as to classes which should or should not be destroyed.

We are, Sir, yours faithfully,

Greene, President of the British Records Association and of the Council for the Preservation of Business Archives.
G. M. Trevelyan, Master of Trinity College, Cambridge.
F. M. Powicke, Regius Professor of Modern History in the University of Oxford.
A. W. Clapham, President of the Society of Antiquaries of London.
F. M. Stenton, President of the Royal Historical Society.
John Forsdyke, Director and Principal Librarian of the British Museum.

Publications Received

Endeavour.—This is the name of a scientific quarterly, the first number of which has been published by Imperial Chemical Industries Limited with the co-operation of the British Council. It opens a phase in scientific journalism that seems fraught with potentiality, particularly for the postwar years—a British journal published in four languages, and in four separate editions; one each in English, Spanish, French, and German. Its circulation is to be approximately 25,000, and it will be distributed mainly to colleges, scientific institutions, clubs, and prominent individuals in foreign countries and the British Empire. "*Endeavour*," to quote Lord McGowan's Foreword, "will act as a vessel to carry overseas news of the continuing vitality and progress of the sciences . . . Our purpose is briefly to enable men of science, and particularly British men of science, to speak to the world in an hour when not only nations but the internationalism of the sciences are threatened by a recrudescence of barbarism in its grossest and most destructive manifestation." Dr. E. J. Holmyard is the Editor and he is assisted by a panel composed of Professor Allan Ferguson, Professor Sir Robert Robinson, Dr. R. E. Slade and Dr. C. H. Waddington. The editorial board has brought together an outstanding collection of names well known as publicists for science. The Astronomer Royal has contributed an article entitled "The Distance of the Sun," in which he summarises work recently completed on the estimation of the sun's distance from the earth. Other authors as distinguished cover topics which in their scope and range show how representative the editorial board has endeavoured to make the first issue. The history of science is well catered for; biology, agriculture, oceanography, and astronomy are all given their place as well as some of the specialised branches of those sciences. *Endeavour* is printed on excellent paper and its make-up and layout are "professional" in the best sense. The illustrations are plentiful and excellent.

Works Organisation and Management. By Edgar J. Larkin. London: The New Era Publishing Co. Ltd., 12-14, Newton Street, W.C.2. 9½ in. × 7½ in. × 1¼ in. 465 pp. Illustrated. Price £1 15s. net.—At a time when engineering works management and production are matters of vital importance from the national standpoint, a work such as that now before us is of even greater value than in normal times; although in any circumstances a volume of this size and scope, would we may assume, be a welcome addition to the bookshelves of those responsible for engineering output or who are in one way or another concerned with such matters. In its 30 chapters the book covers a wide range of subjects commencing with management as a function and concluding with sales organisation and tendering; in between details of factory layout, power supplies, machine tool and other equipment and shop transport are discussed along with numerous other matters pertinent to the subject treated. Space is rightly devoted to the all-important topic of time keeping, covering such items as unpunctuality, absenteeism on the part of employees, and details of time recording instruments and systems, as well as motion and time studies. Questions associated with workshop personnel, welfare work, staff records, and statistics are similarly covered and indeed no phase of the subject that really matters would appear to have been overlooked. This notwithstanding, it is our considered opinion that the work, good as it is, could have been improved, either by curtailing the amount of ground traversed and giving more space to each separate section or by elaborating the general treatment of each sub-heading and issuing the book in two volumes. Perusal of its pages leads one rather to the conclusion that too much has been attempted within the space at disposal, large though that is, in respect of the number of pages and their size. The work is copiously and well illustrated, the number of line drawings and half-tones reaching the respectable total of 335, to which are added 25 tables and some graphs. A large size of type is used, which makes for clearness and ease in reading, and we have a special word of praise for the really excellent and comprehensive index which is supplemented by an equally good contents list and list of illustrations. The Foreword by Dr. W. Alfred Richardson provides a useful key to the assimilation of the subject-matter of the book.

THE SCRAP HEAP

TODT IST TOT

Fritz Todt, the most outstanding civil engineer to be produced by the Nazi regime in Germany, and the organising genius behind Germany's remarkable military transport achievements, is dead. His name means death in German. The official announcement stated that he was killed in an aeroplane accident while carrying out his military duties. He belied his name in 1937 by a last-minute change of plans when otherwise he would have occupied a seat in the Belgian plane which crashed with the Grand Duke Georg of Hess and his family.

* * *

"CHEAPER TO BUY THE RAILWAYS"

Mr. George Ridley, M.P., in a Labour Party pamphlet on the party's proposals for a public-owned transport system, says it would be cheaper for the State to buy the four main railways, now being hired for about £38,000,000 a year. "Their Stock Exchange value is about £750,000,000," he says. "If for the purpose of purchase a loan was raised at 3 per cent., the interest charges would be £22,500,000 instead of the hiring charge of £38,000,000. This would leave a balance of £15,500,000 a year for capital redemption, plant modernisation, or whatever else might be thought to be desirable."

* * *

COST OF RE-ROLLING OLD RAILS AT SWINDON

An extract from "The Fact Book," which has been kept by the Divisional Engineer, Plymouth, G.W.R., and his predecessors for nearly a century.

			£ s. d.
121 tons old rails (estimated value)	@	£3	363. 0. 0
106 ,, new ,, re-rolling	@	£2.15.	291. 10. 0
121 ,, carriage Tmth to Bristol	@	7s/8d.	46. 7. 8
106 ,, ,, Swindon to Teignmouth	@	11s/-.	58. 6. 0
Total cost of 106 tons new rails deld. at Teignmouth or £7. 3. 3. per ton.			£759. 3. 8

			£ s. d.
121 tons old rails (estimated value less carriage to Cardiff)	@	£2.9.3	297. 19. 3
106 ,, new rails re-rolling	@	£2.15.	291. 10. 0
121 ,, carriage from T'mth to Bristol	@	7s/8d.	46. 7. 8
106 ,, ,, ,, Swindon to Tmth	@	11s/-.	58. 6. 0
Total cost of 106 tons new rails deld. at Teignmouth or £6.11. 0 per ton.			£694. 2. 11

	£ s. d.
Hill's present price for new rails per ton	6. 15. 0
Carriage etc., to Teignmouth	10. 9
	7. 5. 9

January 28, 1862

Cost of re-rolling old rails at Swindon works estimating the value of the old rails at £3. 7. 6 per ton, as offered by Mr. Hill.

			£ s. d.
121 tons old rails	@	£3.7.6	408. 7. 6
106 ,, new ,, re-rolling	@	£2.15.	291. 10. 0
121 ,, carriage from Tmth to Bristol	@	7s/8d.	46. 7. 8
106 ,, ,, Swindon to Tmth	@	11s/-.	58. 6. 0
			804. 11. 2
Cr. for loading etc., and delivering f.o.b. at Teignmouth 121 tons at (say) 1s/6d.			9. 1. 6
Total cost of 106 tons new rails at Teignmouth or £7.10. 1 per ton			£795. 9. 8

Mr. Hill offers to supply new rails in exchange for the old rails at £6. 10. 0 per ton

	£ s. d.
Add for freight from Cardiff to Teignmouth	10. 9
	£7. 0. 9

April 6, 1862

"In spite of the Government's very proper discouragement of railway travel, there comes to most people some occasion upon which a long journey by train is necessary. . . . There is now a certain exciting chanciness about the whole thing—though this has not yet reached the standard achieved on some lines in the Rockies, where one strolls down to the station in the morning to ask how many hours it will be before yesterday afternoon's train arrives. . . ."—*From "The Times" of January 29.*

* * *

It was from the circus that the Germans learned transportation methods that enabled them to strike so hard and swiftly early in the world war. The first time Barnum & Bailey played in Germany, in 1901, the Kaiser, hearing of the remarkable speed with which trains were loaded, asked if a few officers could travel with the circus as observers. The German method of loading a big gun or horses on a freight car was to fill each car separately from the side. Our way was to put connecting iron treads from car to car and roll equipment marked for the first car straight through from the end of the train, with everything following in order. By this method the show could be put on three trains of 22 cars each in an hour. The Germans also learned the advantage of our great cooking wagons—the boilers of which were hot long before they started for the show grounds—over their field kitchens with fires built in the open. — *From "This Way to the Big Show."*

* * *

Over 100 years ago when cable-operation was in use between Chalk Farm and Euston, a large bell gave warning of the approach of trains. Later the bell did service as a fire alarm at Camden L.M.S.R. Goods Station, but was disused when an electrical system was installed. Now the bell has been reclaimed and has provided 5 cwt. of valuable metal for salvage.

* * *

A CURIOUS PHANTOM INDICATION

The possibility of phantom indications being seen from various kinds of signal lamps and units was known a long time ago and has always been of great importance in countries where powerful headlights are used. In introducing light signals the problem needed special attention and in certain designs reflectors are impracticable, on account of the danger of phantoms. A curious instance of a driver being misled by a phantom of an unusual kind is reported in the American press and occurred at a crossing between the Baltimore & Ohio and Illinois Central lines at Odin, Illinois. A train had been signalled to pass on the latter and another in due course approached on the former, on which the enginemen found the distant signal at caution and, so it appeared to them at first, the home signal also, but on arriving within about 200 ft. of it the signal was seen to be showing stop Emergency action was taken but it was impossible to avoid fouling the Illinois Central line, the train on which then ran into the Baltimore & Ohio train. It transpired that the home signal had been repainted recently with a glossy paint and at a certain position of the sun the reflection of its rays combined with the ordinary red light produced the effect of a yellow signal. Presumably the signal was of the colour position light type, the B. & O. standard, which makes the phantom still more of a freak.

An advertisement from "Cook's Excursionist," dated September 6, 1871. This was the last summer service before the introduction by the Midland Railway on April 1, 1872, of third class accommodation on all its trains. The Midland Railway second class was abolished on January 1, 1875

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Elimination of Level Crossings

Apart from road surfacing and finishing touches, the extensive work of eliminating level crossings by the constructiou of over- or under-bridges in and around Johannesburg is now complete.

Stewardesses on Trains

Stewardesses have been introduced on the Blue Train running between Johannesburg and Capetown. From the 100 applicants for posts, 18 were chosen as fulfilling the qualifications required, which include manner of speech, personality, health, manner of approach, and bilingualism. All received a week's special training before starting on their first journey. The pay of the stewardesses is the same as waitresses in the South African Railway's restaurants—an initial salary of £8 10s. plus Sunday overtime and the usual railway privileges.

Signalling & Construction Works

Colour-light signalling was brought into use on the Langlaagte-Canada-Orlando section in November last, and has eliminated double-line block working. Incidentally, this change enabled the signal cabin at Croesus to be closed, and coincided with the replacement of an old by a new cabin at Canada.

The extension of the line from Canada to Thomolong and the work of quadrupling the Langlaagte - Nancefield section are reported to be well in hand. All track and electrification works for the quadrupling between Orlando and Canada are complete and ready to be brought into use as soon as the corresponding signalling is finished.

Showerbaths in First-class Saloons

On October 31, 1941, S.A.R. first-class saloons with showerbaths were brought into service on certain long-distance trains; excluding air-conditioned and articulated vehicles, there are now 30 of these saloons in service. The routes on which they are being run are Johannesburg-Bloemfontein-Cape Town, Durban-Cape Town, Cape Town-Rhodesia, Johannesburg-Rhodesia, and De Aar-Walvis Bay. On all trains with more than two first-class saloons, there are at least two with showers, and where only two saloons are included in a train-set, one is fitted with a showerbath. New vehicles being built or contemplated will have showers, and as they come into service this facility will be gradually extended.

WESTERN AUSTRALIA

The Perth and Suburban Tramways

The financial statement of the Western Australian Government Tramway System—operated by the Commissioner of Railways—for the five years ended June 30, 1941, shows that earnings for the past year increased by £28,705, and that working expenses were £6,204 greater than in the previous year. As a result, deficits of £15,077 and £21,816 respectively for the years 1939-40 and 1938-39 were converted to a surplus for 1940-41 of £7,310. The operating ratio was reduced from 90·33 per cent. to 84·41 per cent. and the percentage of net return on capital increased from 2·66 per cent. to 4·67 per cent.

The number of passengers carried during the twelve months was 34,311,807, an increase of 2,642,754. Car-miles run increased by 81,546 car-miles, namely, from 3,835,670 to 3,917,216, and the passengers per car-mile from 8·26 to 8·76. The earnings per passenger were 2·33d. Petrol rationing, and the consequent necessity for car owners to use alternative methods of transport, has been the principal factor contributing to the increased earnings.

The rolling stock was added to by the placing in service of six petrol motorbuses, each with seating capacity for 28 passengers, and these are used to supplement the existing trolley-bus services. The capital account of the system was increased by £9,970.

BRAZIL

Conversion of Gauge: San Paulo & Minas Railway

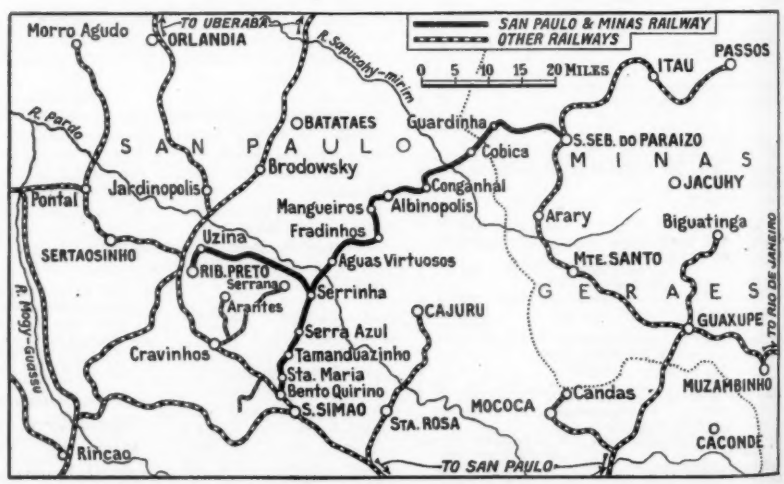
When the San Paulo & Minas Railway from Bento Quirino, in the State of São Paulo, to São Sebastião do Paraizo, in the State of Minas, 137 km. (85 miles) was opened in 1911, it provided means of transport for imports to the State of Minas, and exports from the south-western area of that State, so that, with the heavy traffic obtaining, the railway flourished. With the opening in 1914 of the Passos branch of the Mogyana Railway through São Sebastião do Paraiso, traffic was diverted from the San Paulo & Minas Railway, which consequently ceased to pay.

The Companhia Electro Metallurgica Brasileira acquired the S.P. & M.R. in September, 1922, mainly with the object of using it for the carriage of iron ore from the mines near Jacuhy, in the State of Minas Geraes, to the smelters at Ribeirão Preto. Before this could be done, it was necessary to build two branch lines, one from Jacuhy to Morro do Ferro, on the Mogyana Railway near São Sebastião do Paraizo, and the other from Serrinha to Ribeiro Preto; the latter is 44 km. (27 miles) long. As the greater part of the distance the ore had to be carried was over the 60 cm. (2 ft.) gauge S.P. & M.R., the branches were constructed to that gauge, and a third rail was laid to enable the 60 cm. stock to run over the short section of the metre-gauge Mogyana Railway between Morro do Ferro and São Sebastião do Paraizo.

With the bankruptcy of the Companhia Electro Metallurgica Brasileira in 1929, these lines were closed from April, 1929, to March, 1931. The State then took charge, and re-established traffic on the main line, but left closed the Ribeiro Preto branch and the Jacuhy mining line. The State also began examining the possibilities of the railway. It was found that, in addition to what traffic emanated from its own zone, it was also possible to count on traffic interchanged between the Alta Mogyana-Alta Paulista, and south-west Mineiro zones, the San Paulo & Minas route being shorter than the Mogyana. It was therefore decided to widen the gauge and provide the necessary facilities for the interchange of traffic. On May 8, 1935, the railway was adjudicated the property of the State of São Paulo.

In the meantime steps were taken to unify the gauge with that of neighbouring railways, and, in the first place, new metre-gauge sleepers were substituted for 60 cm., cuttings and culverts were widened, and other adjustments made. The whole line was fenced with concrete posts at a width of 15 m. both sides of the line. Gauge widening was not rapid, but was carried out with efficiency and economy. The method adopted was novel and worthy of special note as showing what can be done in circumstances such as prevailed. Work began at São Sebastiao do Paraiso without the use of a third rail, the two existing rails being moved further apart. Metre-gauge locomotives and rolling stock were transported in the first instance from Bento Quirino to São Sebastiao do Paraiso on 60 cm. bogie trucks and there unloaded on to sidings previously laid. As the widening proceeded, more metre-gauge stock was required, and so the narrow-gauge stock was transferred from its narrow-gauge bogies to metre-gauge bogies at the point where widening happened to be taking place.

There was no interruption to passenger traffic during the gauge conversion, for passengers were transhipped at the point of conversion. The transhipment of merchandise was carried out only at stations, and this meant, of course, that after one lot of merchandise had been transhipped nothing more was handled until widening operations reached the next station. In order to hasten the work, widening was



The San Paulo & Minas Railway in relation to adjacent lines

later begun from Bento Quirino also; this entailed two transhipments and necessitated the concentration of the narrow-gauge stock in the middle of the narrow-gauge section at Serrinha.

The whole 137 km. section was converted in 124 days with a maximum of 110 men, employed at any one period. The daily average progress was, therefore, 1,104 m., and the total cost worked out at 177 contos of which 65 contos went in labour and 112 contos in material. The widening of the gauge enabled vehicle loadings to be increased by 60 per cent., and a general acceleration of timetables was immediately possible.

UNITED STATES

Railway Relocation in Syracuse

In 1936 the New York Central System opened a new passenger station and approach lines in the city of Syracuse, New York State, which permitted the abandonment of the previous slow and troublesome access along 1¼ miles of Washington Street, in the heart of the city, to the original depot —an anachronism in a high-speed main line such as this one from New York to Chicago. Other important railways still used the streets of Syracuse, however, and the last stage in their removal to independent tracks has now been reached by the completion of the Delaware, Lackawanna & Western RR. grade separation scheme. This has involved the construction of a new double-line 2¼ miles long, with 23 bridges or viaducts, including a span of 128 ft. over West Onondaga Street, flanked by ten 45-ft. spans over adjacent streets, and a skew span of 116 ft. over South Salina Street. A total of 5,800 tons of steel has been required for the bridgework alone, notwithstanding the use of nickel steel for weight reduction.

Freight Car Reconditioning

In addition to an enormous programme of new construction, the Pennsylvania RR. is steadily carrying out a scheme of freight car modernisation, whereby an average of 3,000 reconditioned cars is being returned to stock monthly. Only those parts are being preserved in the course of the repairs which are regarded as capable of giving service equal to new, and at the same time all the standardised modern features are being applied to the old stock. With the 11,876 new freight cars called for in the 1941 and 1942 programmes, it is expected that by October 1, 1942, just prior to the normal annual traffic peak, the Pennsylvania will have 23,000 more cars in service, and will have reduced the number of cars under repair to 3·4 per cent. of the total, a minimum practical working level.

Heavy Locomotives for the C. & O.

Steam locomotives placed recently on order include ten of the 2-6-6-6 type for the coal traffic of the Chesapeake & Ohio RR., over its heavily-graded main line; the first of these have appeared from Lima Locomotive Works. With many modern American locomotive types, especially the articulated engines, a 4-wheel bogie is found necessary for the support of the firebox end of the engine, but further growth in boilers and fireboxes is leading to the use of 6-wheel bogies for this purpose, as in these new C. & O. locomotives.

A Pennsylvania Diesel Inquiry

Considerable interest has been aroused by the enquiry of the Pennsylvania Railroad for a 4,000-h.p. diesel-electric unit for passenger service. Hitherto, outside its electrified area, this influential company has remained faithful to steam for all its passenger haulage, notwithstanding the heavy gradients of its main line through the Alleghenies, and the high speeds of its principal expresses between Crestline, Fort Wayne, and Chicago. The service for which this diesel unit is proposed has not been specified.

The Sunchaser

The all-Pullman service between Chicago and the Florida coast which the Illinois Central RR. instituted on December 17, as part of the co-ordinated train service scheme shared by ten railways over three different routes between this point, is called the Sunchaser. Like the all-coach City of Miami diesel streamliner of the Illinois Central, the Sunchaser works over the Central of Georgia, Atlantic Coast, and Florida East Coast lines to reach Miami.

End of Erie Receivership

On December 23 last the new board of directors of the Erie Railroad, which had taken over the properties on the previous day, received an order from the district court freeing the company from the receivership into which it passed on May 7, 1938. The reorganisation of the Erie was completed in less than four years, and Judge Robert N. Wilkin described this as "an outstanding record of expedition in such cases." Mr. Robert E. Woodruff, co-trustee and chief executive officer, has been elected president of the new company.

FINLAND

State Railways Results in 1940

Operating results for 1940 were recently published by the State Railways administration. At the beginning of the year Finland was still at war with Russia, but peace was concluded in March, and the second war with Russia did not begin until 1941. For the first months of the year, therefore, the railways were worked under war conditions, whereas for the rest of the year the system was reduced in length by the transfer of lines in ceded territory. The following are the financial results in Finnish marks compared with those for 1939:—

	1939	1940
Gross receipts	1,150,900,000	1,274,900,000
Working expenses ...	940,000,000	999,000,000
Net revenue	210,900,000	275,900,000

The staff numbered 12,897 at the end of 1940, only a few less than a year before. After the peace in March preparations were made at once for the construction of the 864-km. (540-mile) Salla line in north-east Finland, in accordance with the peace treaty, and 75,000,000 marks were voted for its construction; it is not stated whether work was actually begun in 1940.

SWEDEN

Rails of 40-metre Length

The Swedish State Railways have recently decided to take extensive measures to reduce the number of rail joints. The old rails of 20 metres are being welded into lengths of 40 metres (131 ft. 3 in.) or are being replaced by new and heavier rails of the latter length. Great attention is also being paid to the remaining rail joints, which, by means of lifting and welding, are being made as even as possible.

State Railways Capital Expenditure during 1942

A sum of Kr. 66,000,000 as capital expenditure on the State Railways during 1942 was recently voted. This amount is to be allocated as follows: 19,600,000 for rolling stock, 19,000,000 for electrification, 10,000,000 for doubling, 4,700,000 for permanent way, 2,000,000 for signalling equipment, and 1,500,000 for the final expenditure on the new steamer for the Malmo-Copenhagen ferry, on which Kr. 4,000,000 have already been spent.

The new rolling stock will consist of 60 third-class steel bogie carriages, 30 steel luggage vans, 3 restaurant cars, 7 third-brake composites, and an unspecified number of goods vehicles.

The electrification allotment is intended for the final equipment of the Halsingborg-Hassleholm (77 km.), Eslov (40 km.), Sundsvall-Ange (95 km.) and Gavle-Ockelbo (38 km.) sections.

The sections scheduled for doubling are: Jarna-Kathrineholm (86 km.), of which Flen-Katrineholm (24 km.) is to be completed in 1942; Palsboda-Hallsberg (14 km.); and Laxa-Gardsjo (23 km.)—all on the Stockholm-Gothenburg main line—and Mjolby-Tranas (37 km.) on the Stockholm-Malmo main line. Work on parts of these is to begin in 1942, but not all of them are scheduled for completion this year.

The 61-km. Kil-Daglosen section of the Kil-Falun line, of the 1941 schedule, was brought into electric operation on November 10, 1941. Further electrification of this route has been postponed for the time being. Kil is on the Stockholm-Oslo main line, from which junction the Falun lines runs north towards the Gavlo district.

BOHEMIA-MORAVIA

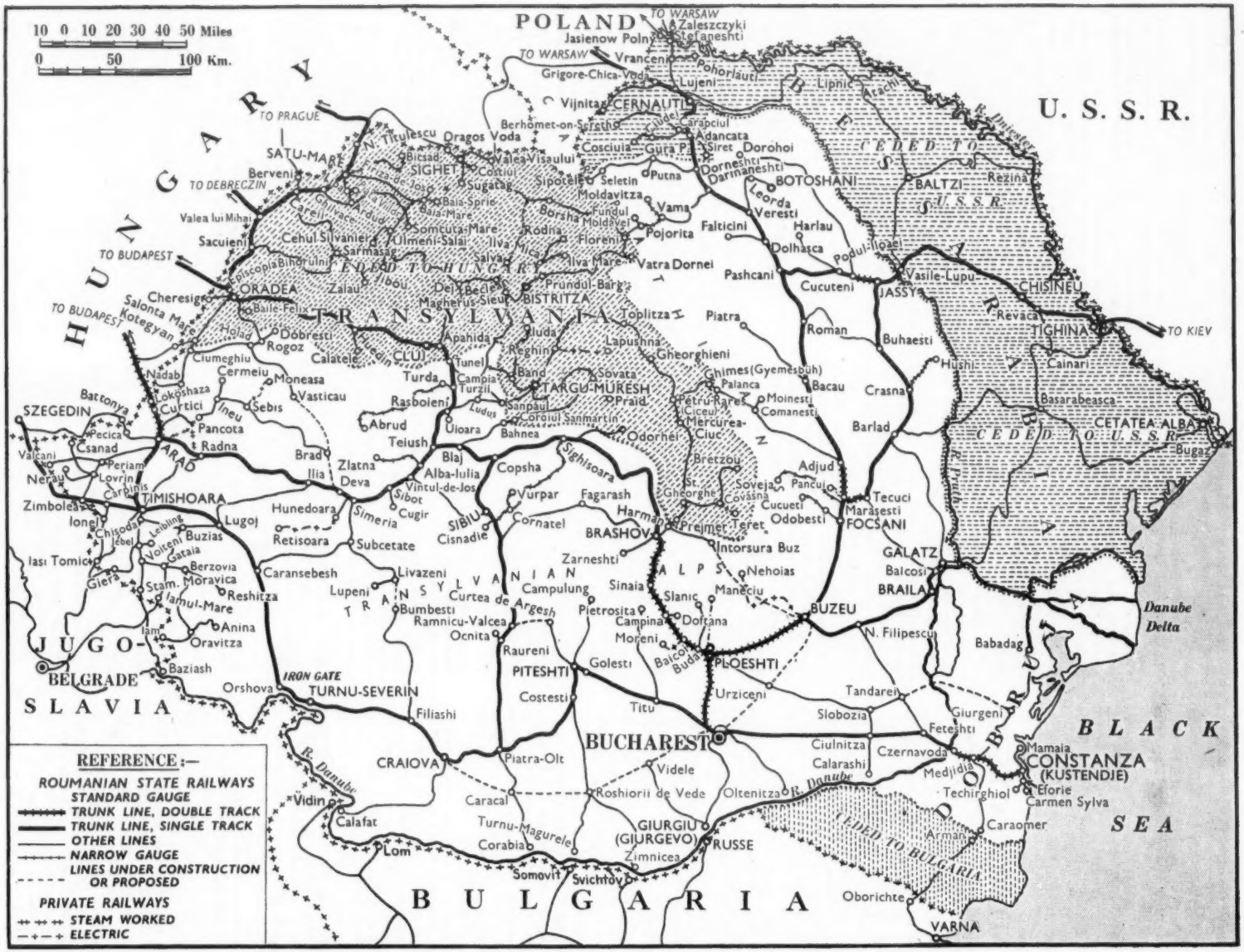
Duchcov-Podmokly Railway

At the general meeting of the Duchcov-Podmokly (Dux-Bodenbach) Railway Company, held early in December last, it was decided under German pressure to transfer the company's headquarters from Prague to Karlovy Vary (Karlsbad). The company's accounts for 1938, 1939, and 1940 were approved. The company's share capital before the Czechoslovak dismemberment was Kč 50,000,000 (now Reichsmark 6,000,000), and earned a dividend of 2·8 per cent. in 1937. Out of the present surplus of RM. 638,836, RM. 300,000 were allocated to renewal of plants, and RM. 300,000 were set aside for payment of dividends. The interest and sinking fund service for the priority loans has been resumed as a result of an agreement concerning the redemption of the loans. Before the Czechoslovak dismemberment these loans appeared on the company's balance sheet as the 4 per cent. Kč 19,100,000 loan, and as the 3 per cent. Kč 30,620,000 loan.

Negotiations are in progress with the Sudetenland Mining Company (Sudetenländische Bergbau A.G.) concerning the cession by the Duchcov-Podmokly Railway of its brown coal mines in the Most (Brüx) region, in connection with the German-dictated reorganisation of the Sudetenland brown coal production industry.

The German-installed Commissar who has managed the affairs of the Duchcov-Podmokly Railway since the division of the country, has now been replaced by a board, the Chairman of which is Dr. Heinz Ansmann (Berlin). Other leading members are Dr. Hans Horner (Elbogen); Richard Russ (Principal Burgomaster of Karlovy Vary); Dipl. Ing. Siegmund Schauberger (Korlovy Vary), who was the company's Managing Commissar; and Dr. Eng. H. W. Wagner (Düsseldorf), Manager of the Niederrheinische Bergwerks A.G., Neukirchen.

The German Reichsbahn resumed the payments of the instalments on the balance of the redemption amount in arrear as a result of the Czechoslovak State Railways' refusal to continue payments after Germany's seizure of the Sudeten province. The last payment made by the Czechoslovak State Railways to the company was on June 30, 1938.



The railways of Roumania, showing territories ceded to neighbouring countries

Bessarabia and Northern Bukovina were ceded to Russia in June, 1940; the whole of Bukovina had been taken over by Roumania from Austria in 1919, and Bessarabia from Russia in 1920. The portion of Dobrudja acquired from Bulgaria in 1913 was handed back in August, 1940. Roumania took over Transylvania from Hungary in 1920, and restored the northern portion (under German pressure) in September, 1940

THE RAILWAYS OF ROUMANIA

Some notes on the loss of mileage to neighbouring States, new construction in hand and planned, and revised frontier traffic arrangements

THE Roumanian State Railways system before the war consisted of 10,715 km. (6,660 miles) standard gauge, and 660 km. (412 miles) narrow-gauge lines, operated in four divisions with headquarters at Bucharest, Timishoara, Cluj, and Cernauti. With the territories ceded to neighbouring states, the system lost 1,750 km. (1,090 miles) of standard-gauge, and 355 km. (220 miles) of narrow-gauge lines to Hungary, 65 km. (40 miles) of standard-gauge line to Bulgaria, and 1,665 km. (1,030 miles) of standard-gauge and 65 km. (40 miles) of narrow-gauge lines to Russia. Most of the Cluj Division, including Cluj itself, and part of the Timishoara Division went to Hungary, over half of the Cernauti Division with its headquarters to Russia, short lengths of the Bucharest Division were transferred to all three countries. The remaining system was reorganised under a military directorate, centralised in Bucharest. The sections ceded to Russia were converted to the Russian 5 ft. gauge, but since the Axis invasion of Russia they have been reconverted to standard gauge, the third conversion in their history.

New Lines and Other Works

Important extension and reconstruction works have been planned, brought under construction, or completed. In addition to the Czernavoda—Constanza and Arad—Curtici formerly-existing double-line sections, the Bucharest—Ploeshti—Brashov and Ploeshti—Buzeu main lines have now been doubled, as well as the Adjud—Tecuci section of the Adjud—Danube delta ports line. Moreover, the Ploeshti—Brashov section is being electrified and this work is expected to be completed by the end of 1942. On various lines the track is being strengthened, a heavier rail, weighing 49 kg. a metre (98 lb. a yd.) having been introduced.

New main lines are under construction as follow:—

1. A new alternative route from Bucharest to the Hungarian frontier, provided by a new through connection from Craiova to Oradea, using various existing branch lines which are being realigned and strengthened. New sections to bridge two of the gaps are already under construction: (*a*) from Bumbesti to Livazeni, 30 km., in difficult country, involving 38 tunnels, several bridges, a ruling gradient of 1 in 70, and sharp curvature, and (*b*) between Deva and Brad, 36 km., in flat country. Construction work on (*a*) was begun in 1924, stopped later, restarted in 1937, and is now being speeded up so as to be ready, together with the second section, in 1942, when work on the last gap, from Brad to Vasticau will be begun to complete the route.

2. Another new alternative and more direct main line between Bucharest and Craiova—south of the existing line—*via* Videle (Vida), Roshiorii, and Caracal. This in flat country, and is to have no gradient steeper than 1 in 300, easy curvature, and formation and bridges for double track throughout; the second track is to be added immediately after the first has been brought into service. This line is 202 km. (125 miles) long, compared with 250 km. (155 miles) of the existing line *via* Piteshti.

3. A double-track main line to connect Bucharest, Urziceni, and Buzeu, and serve as a relief to the existing line *via* Ploeshti. This line, 130 km. (80 miles) runs through flat country and has few construction problems.

4. A line from Tandarei to Giurgeni, crossing the Danube, and providing a second route to the port of Constanza on the Black Sea. This line is believed to be nearly finished.

After completion of these lines, a further four-year plan provides for a main line of 110 km. (68 miles) between Buzeu and Intersura-Buzaului, completing a second connection between Brashov and the Black Sea, as well as a rather roundabout loop between Brashov and Bucharest, when considered with the lines 4 and 3 respectively now under construction. This line is to be completed before the end of 1945, and it is ultimately to be electrified. The same plan includes a 32 km. (20 mile) new link between Curtea-de-Argesh and Ramnicu-Valcea, also to be open in 1945, providing an alternative through route between Bucharest and the north-west.

The expenditures involved in the first four works amount to 6,200,000,000 Leu (about £8,000,000), and those for the second plan to 4,200,000,000 Leu (about £5,500,000).

Frontier Arrangements

According to an announcement of the Roumanian State Railways, the following Roumano-Hungarian frontier stations were opened for the goods traffic as from July 31, 1941: Floreni, Bahnea (Coroiu), Tunel, Palanca, Sanpaul, and Prejmer. These transit stations are open exclusively for Germano-Roumanian goods traffic or for German transit goods traffic.

Floreni, Palanca, Prejmer, and Tunel are used for traffic to and from Roumania only, and the German goods traffic to and from the so-called Szekler province—the south-eastern part of the Transylvanian territory ceded to Hungary—uses Bahnea (Coroiu) and Sanpaul frontier stations for privileged transit through Roumanian territory.

The alignment of the new frontier between Roumania and Hungary made it imperative for the Roumanian and Hungarian railways to use, reciprocally, sections of lines lying in the other country's territory in order to maintain connection with its own territory. Thus Roumanian trains use a Hungarian transit line from Palanca (Gyemesbüh) to Sanpaul, connecting at the latter station with a new Roumanian line leading to Tunel (96 km., 60 miles). The Roumanian section Sanpaul—Tunel is also being used by the Hungarian trains in transit.

Floreni is on the line branching off at Darmaneshti from the Bucharest—Cernauti main line, and lies 119 km. (74 miles) to the west of Darmaneshti. Palanca is on the line, which, branching off from the above main line at Adjud (roughly midway between Bucharest and Cernauti) crosses the Carpathian mountain range in a westward direction. Palanca is 103 km. (64 miles) to the west of Adjud and the next station to the west (5 km., 3 miles) is the Hungarian frontier station Ghimes (Hungarian name: Gyemesbüh). Sanpaul is on the same line, which, after crossing territory now assigned to Hungary, re-enters Roumania. Sanpaul is 244 km. (151 miles) to the west of Palanca, or 19 km. (12 miles) to the west of Targu Muresh (now called in Hungarian Marosvásárhély), the only important town in that region. This line connects at Razboieni with the main line leading from Brashov to the north-west and further on to Cluj (now in Hungary and called Kolozsvár). Razboieni is 40 km. (25 miles) to the south-west of Sanpaul. The main line from Brashov to Cluj leaves Roumanian territory at Tunel, 23 km. (14 miles) to the south-east of Cluj. There is now a new Roumanian line between Tunel and Sanpaul. Bahnea (Coroiu) is on the line branching off at Blaj (to the east of Teiush on the Bucharest—Cluj main line) and leading to Praid. Bahnea is 55 km. (34 miles) to the north-east of Blaj and the first station on Hungarian territory is Coroiul Sanmartin, 10 km. (6 miles) further to the east. Prejmer is 16 km. (10 miles) to the north-east of Brashov on the line connecting at Ciceu with the Palanca—Sanpaul section.

Normal commercial goods traffic between Roumania and Hungary proper is restricted to two lines, those leading from Arad (Roumania) to the north-west and west respectively. Frontier stations on the former line are: Curtici (Roumania) and Lökösháze (Hungary), and on the latter line Pecica (Roumania) and Battonya (Hungary). Curtici is 17 km. (10·5 miles) to the north-west of Arad; Pecica is 21 km. (13 miles), and Battonya 36 km. (22 miles) to the west of Arad.

CAUSE AND EFFECT OF BIG-END KNOCK

An examination of the forces on the driving crank pins of a locomotive under the varying conditions of normal running and when coasting or drifting

By G. E. LANGRISH, A.M.I.Mech.E., A.M.I.Loco.E., late Assistant Locomotive Superintendent, Burma Railways

BIG-END knock is a condition that is aggravated on railways having long heavy gradients. Where the regulator has to be closed for considerable periods governed by distance, as in descending long banks, it is not unusual to find that the connecting rod big-end bushes run excessively hot, whereas normal running with the regulator open causes no undue heating. These conditions apply with greater force to older than to the latest designs of engines wherein some form of relief valves are provided for coasting purposes. As a result of extended investigation of the subject under varying conditions, the present writer seeks, in this article, to explain the difference in effects between running with and without a supply of motive steam from the regulator.

Considering, first, normal running with regulator open, the conditions may be studied from indicator cards. Fig. 1 illustrates the type of indicator card which may be expected.

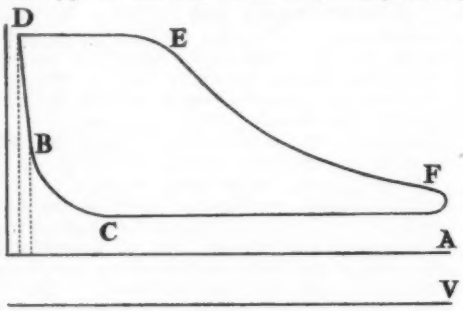


Fig. 1

The line A represents atmospheric pressure; and V, the line of complete vacuum, is drawn below it to the scale of the spring. In the cycle of operations admission begins at B, the point of pre-admission, due to the lead, and the steam instantly rising to D, admission continues to the point of cut-off at E, expands to the point of exhaust at F and from this point to C the line of pressure is practically straight, indicating the amount of back pressure. At C the exhaust valve closes and compression begins.

The effects of compression and lead, besides building up the pressure behind the piston for the commencing stroke and raising the temperature of the cylinder covers and pistons, etc., which are their main functions, also serve the very useful purpose of providing a cushion which tends to bring the reciprocating masses to rest quietly at the end of the stroke, thus avoiding any jar on the motion. In this way any slack in the big end bush, for instance, is gradually taken up, and the compression in the connecting rod is changed to tension and *vice versa* in a comparatively gradual manner. Obviously as the engine is working most of the time under steam, cut-off and compression must be carefully watched in valve setting to see that they suit the steam distribution. As will be shown later, the conditions prevailing when the engine is coasting are quite different, and the valve events do not suit these conditions.

When considering the steam pressures on a piston, the effect on both sides must be studied, as the pressure on one side partly counterbalances that on the other, and this is shown in Figs. 2, 3 and 4. Figs. 3 and 4 show the resultant forces of the steam on each side of the piston when the piston is moving from left to right. From A′ to B′ the resultant pressure acts from left to right and from B′ to C′ from right to left, showing clearly the effects of cushioning. Attention is next drawn to the inertia effect of the reciprocating masses. As is well known, the forces due to inertia acting on the piston vary in direction on either side of a point just forward of mid-stroke because of the angularity of the connecting-rod. This is shown in Figs. 5, 6 and 7. Fig. 6 is an interpolation of Figs. 4 and 5. The result (Fig. 7) will be seen to be a much more gradual loading on the crank pins. The resultant of all the forces is hereby shown to give a more or less continuous thrust for the whole stroke—unlike Fig. 4.

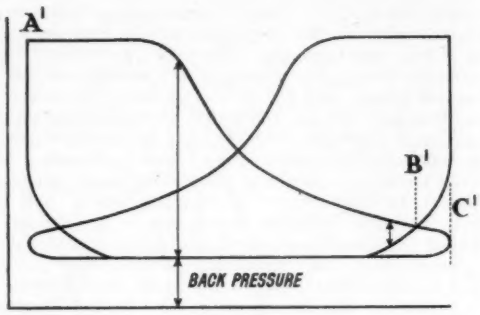


Fig. 2

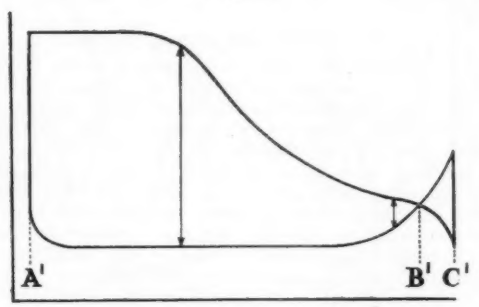


Fig. 3

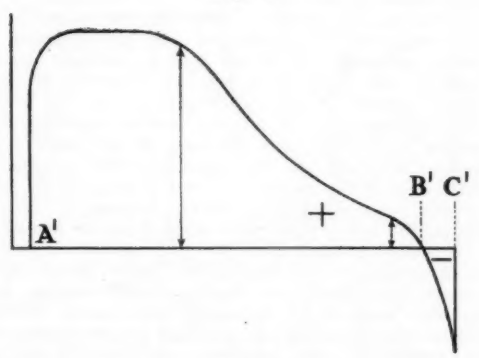


Fig. 4

Coasting with the Regulator Shut

The foregoing is the accepted theory on the subject, and the following study is based on the same principles. Fig. 8 shows an indicator card such as might be obtained under similar conditions of speed and cut-off to Fig. 2 and the

cylinders now act as air pumps. At point D^2 pressure may be slightly above atmospheric, due to sudden supply of compressed air from the end of the previous piston stroke. D^2 to F^2 is the suction stroke when air is drawn *via* the usual anti-vacuum valve through the steamchest for the first part of the stroke and through the blast pipe on the latter part of the stroke. At the end of the stroke, G^2, pressure rises to atmospheric, and on the return stroke the air is forced

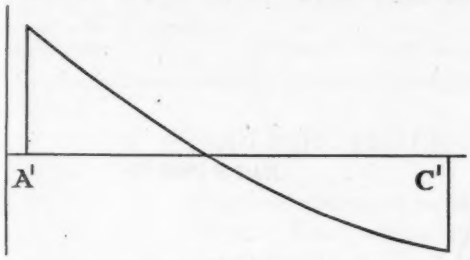


Fig. 5

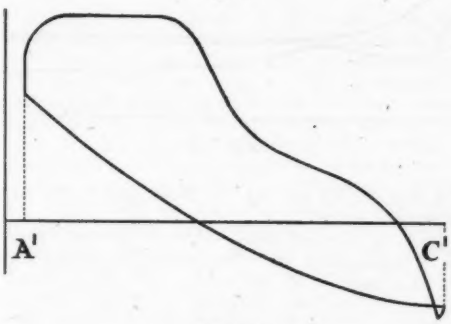


Fig. 6

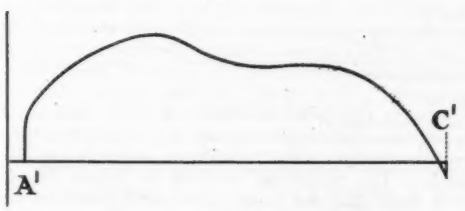


Fig. 7

back through the exhaust port until it closes, at C^2, when compression begins. Compression is rapid from C^2 to B^2, and when B^2 is reached the valve is about to open to the steamchest as a consequence of lead. Instead, therefore, of a rise in pressure, as in the steam diagram, there is now a collapse as the compressed air escapes into the steamchest, which has a partial vacuum.

Fig. 11 shows the resultant pressure on the crank pin,

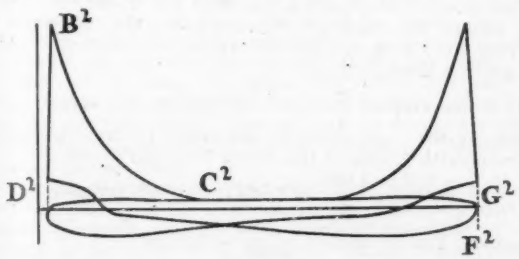


Fig. 8

and has been derived from Figs. 8, 9, and 10, in a similar manner to Fig. 7. In these diagrams, it is assumed that the pressure of air built up at the point of pre-admission, B^2 in Fig. 8, is greater than the inertia force; this does not occur in full open gear, but only at low cut-offs, such as 45 per cent. which is the usually accepted coasting position nowadays. Formerly it was the recognised practice for drivers to put the lever in full fore gear when coasting, and indeed this is still done in many cases. The practice, however, changed with high superheat temperatures necessitating drift steam to carry in a certain amount of atomised oil to the valve parts. Drift steam does not of course maintain much steamchest pressure, and consequently does not prevent knock. The difference between Figs. 7 and 11 in itself goes some way towards explaining knock, but is not conclusive.

The relation between the connecting rod bush and the crank pin may next be considered. If, for the moment, we visualise the cylinder covers removed, the inertia force at each end of the stroke would maintain the contact between

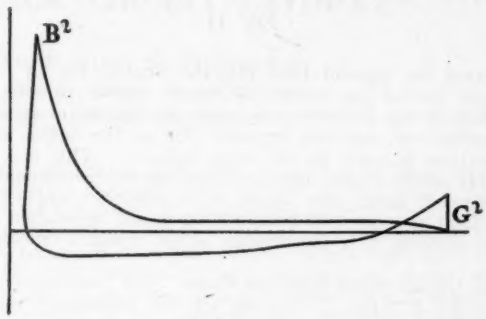


Fig. 9

bush and crank pin, and there would be no marked tendency to knock. However, on considering Fig. 10 it will be seen that the air pressure up to point B^2 is greater than the inertia force; therefore any slack there may be in the bush will be maintained on that side of the crank pin opposite its natural tendency due to inertia. Thereafter, unlike the steam cycle, the pressure is removed and the crank pin returns with maximum acceleration to knock in the bush, and this causes a much higher stress in the motion than even Fig. 11 would seem to show.

An attempt by calculation is made later to arrive at some idea of the magnitude of this knock force from actual con-

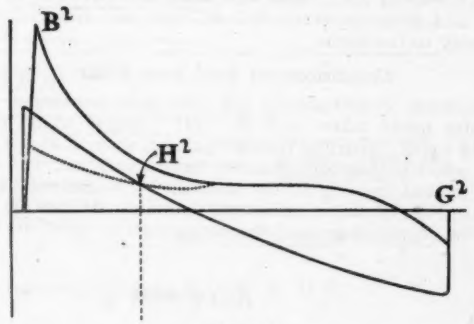


Fig. 10

ditions observed with an Indian State Railways Class " YD " locomotive. The dotted lines in Figs. 10 and 11 show the effect of reducing air pressure below the line of inertia forces. Fig. 11 shows that in this case the pressure changes in the opposite direction at H^2 so that the point of contact between bush and crank pin is reversed further back in the stroke and comparatively gradually. In other words knock, as we understand it, is eliminated.

This study does not by any means presume to be exhaustive but is an attempt to explain what experience seems to indicate; namely, that when an engine has worn big-end and side-rod bushes, the knock, judged from the sound, is much more evident when coasting than when steaming. This aural evidence is backed up by trials showing that cylinder relief apparatus lengthened the periods between maintenance of big ends, horn wedges and other parts. Moreover, if it be

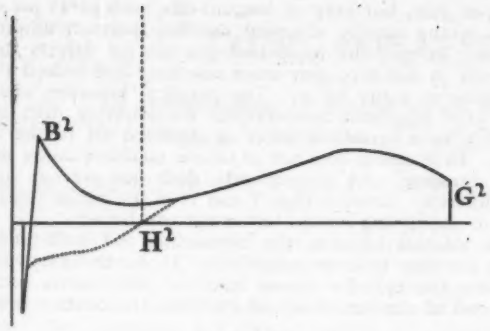


Fig. 11

true that the big-end bush may be floating for an instant at each end of the stroke, it would appear to affect the stability of the locomotive because the balance weights will be unbalanced, and the opposite side of the engine is also affected on account of the cross balance. This may conceivably afford an explanation of mysterious derailments. If, as reasoned later, the knock is a suddenly applied load equivalent to a pressure greater than would be reached under steam working, this presumably would create a tendency to hunt.

The Indian State Railways Class "YD" locomotives are of the 2-8-2 type. Following are the dimensions relevant to this discussion :—

Dia. of piston	17 in.
Stroke ,, ,, ...	24 in.
Length of conn. rod.	8 ft. 6 in.
Dia. of driving wheels	4 ft.
Boiler pressure...	180 lb. per sq. in.
Weight of piston	64 lb.
,, piston rod	98 lb.
,, crosshead	146 lb.
,, ½ conn. rod	81 lb.
Reciprocating weight	389 lb.
⅝ conn. rod. revolving weight	163 lb.

It is assumed that there is no slackness in the small end but that the slackness, if any, is in the big end of the connecting rod. It is also assumed that there is no slackness in the crown of the driving axleboxes and between the horn faces, and that the crank is held rigid but free to revolve relatively to the frame.

Conditions of Full Fore Gear

Respecting conditions of full fore gear working; actual indicator cards taken with a "YD" engine at 35 m.p.h., *i.e.* 245 r.p.m., with the regulator closed show that the maximum effective pressure reached before collapse, *i.e.* at the point of lead opening to the steamchest, is about 33 lb. per sq. in. Fig. 12 shows an actual diagram. It can be shown that the inertia forces of the reciprocating parts are, front

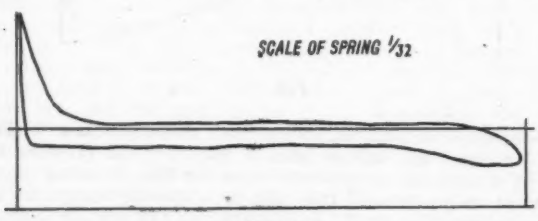


Fig. 12

and back, equivalent to pressures over the piston area of 39·4 lb. and 31·0 lb. per sq. in. When dealing with resultant forces on the crank pin, one force is usually left out of consideration. This is the centrifugal force of ⅝ of the mass of the connecting rod which is considered as revolving. This force is equivalent to 14·8 lb. per sq. in., giving total inertia forces of 54·2 lb. and 44·8 lb. per sq. in. respectively. Therefore, in full fore gear the air pressure is insufficient to overcome the inertia force, and the result will be somewhat as indicated by the dotted lines in Figs. 10 and 11. This, then, is one condition, for avoiding knock.

Conditions at 45 Per Cent. Cut-off

Actual indicator cards taken with a "YD" engine at 35 m.p.h. with the regulator closed show that the maximum effective pressure reached is about 70 lb. per sq. in. Fig. 13 represents an actual diagram. Inertia forces at this speed

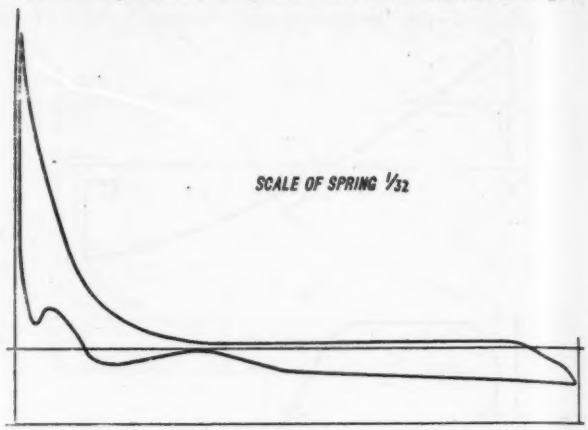


Fig. 13

being 54 and 45 lb. per sq. in. front and back shows that knock can take place.

No slack in big-end bush.—Assuming that there is an absence of slack, then the effect would be a sudden drop in pressure of 16 and 25 lb. per sq. in. at front and back respectively. As the contact between bush and pin cannot be broken, this must not be considered as knock in the sense of an impact, but it is analagous to hammer blow where the driving wheels are always in contact with the rails.

$\frac{1}{16}$-in. slack in big-end bush.—In Fig. 11 it is seen that with $\frac{1}{16}$ in. slack in the big-end bush the effective force on the crank pin is acting one way right up to point B^2, and then a sudden change occurs. This means that the air pressure maintains the bush with the $\frac{1}{16}$ in. of slack one sided and at the dead centre position, the reciprocating parts having come to rest, the crank returns with maximum acceleration to knock the bush. The following analysis is based on $\frac{1}{16}$ in. of slackness in the big-end bush. The acceleration of the crank pin towards the centre of the wheel is 658 ft. per sec. per sec. If we take 650 ft. per sec. per sec. as the acceleration acting over the distance of $\frac{1}{16}$ in., the time taken for this is :—

$$t^2 = \frac{2S}{f} \text{ and therefore } t = \frac{1}{250} \text{ sec.}$$

and the velocity reached v = ft.

$$= \frac{650}{250}$$

$$= 2{\cdot}6 \text{ ft. per sec.}$$

The velocity of the crank pin relative to the crank-pin bush at the moment of impact is therefore 2·6 ft. per sec., and we can assume the crank pin stationary and the connecting rod moving away from it with this velocity and suddenly brought to rest in a given time.

It is conceivable that this time might be, say, $\frac{1}{1{,}000}$ sec. Therefore the deceleration of the mass of reciprocating parts together with ⅝ mass of the connecting road would be

$$f = \frac{v}{t} = \frac{2{\cdot}6 \times 1{,}000}{1} = 2{,}600 \text{ ft. per sec. per sec.}$$

Therefore force of impact $= \frac{552}{32} \times 2{,}600$ lb.

$$= 44{,}850 \text{ lb.}$$

which is equivalent to a pressure over the piston area of about 195 lb. per sq. in. To appreciate the effect of big-end knock it would be necessary to depict the line B_2 (Fig. 11) projected to scale vertically. This would then clearly demonstrate the effect above referred to.

Checking back on this time of $\frac{1}{1,000}$ sec., it has already been stated that the crank has reached 2·6 ft. per sec. on impact. Therefore distance covered after impact, *i.e.* in $\frac{1}{1,000}$ sec.

$$= \frac{2{\cdot}6 \times 12}{1,000} \text{ in.}$$

$$= 0{\cdot}031 \text{ in.,}$$

which shows that the assumption is fairly reasonable.

Admittedly this result is not absolutely correct, but it may be accepted as sufficiently so for the purpose in that it furnishes a tangible idea of what the value of the force might be. The obvious solution of the problem is to prevent the effective pressure at the end of the stroke from overcoming the effects of the inertia forces. Although the parts concerned do stand up to the hammering they get, some form of cylinder relief apparatus is beneficial from a maintenance point of view.

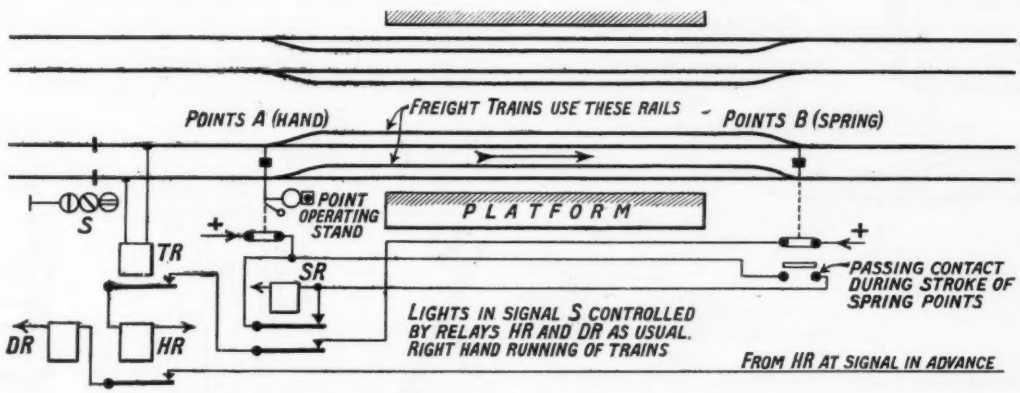
The " YD " locomotive is designed to take by-pass valves, but these were blanked off for the above investigation. With by-pass valves in proper working order, sufficient cylinder relief is provided at 45 per cent. cut off.

A PECULIAR TRACK AND TRACK CIRCUIT LAYOUT

Platform clearance on the Chicago, North Shore & Milwaukee electric line necessitates special track and track-circuit arrangements to allow freight trains to pass through stations

THE Chicago, North Shore & Milwaukee Railway, on which trains are operated at 600 volts d.c., taken over most of the route from overhead wires, was worked for many years without any block system, signals being used only at interlocking points. Reliance was placed on a careful lookout being kept by drivers and on the standard American timetable and operating rules, which contain strict injunctions for the protection of trains by their crews when scheduled running cannot be maintained. Traffic was, of course, controlled by the customary train dispatcher method. Good results were, on the whole, obtained, but we had occasion to refer in an editorial note in our issue for April 16, 1937, page 734, to a collision which occurred between a North Shore train and an Elevated train on an unsignalled section where there was an excellent view ahead on a straight piece of line. For some few years, however, it has been recognised that modern signal protection is necessary and it has been installed as opportunity has arisen. We recorded, in our issue for August 26, 1938 (page 356), the completion of a 25-mile section between Howard Street junction, Chicago, and North Chicago, part of which is used by trains of the Chicago Rapid Transit Company. Three-aspect light signals are used.

A recent extension of this colour-light signalling on 3½ miles of double track between Indian Hill and Glencoe stations, where the line has been regraded to enable 11 level crossings to be replaced by bridges, contains some peculiar features. (Previously trains had to run at restricted speed along this section, on account of the crossings.) At all except one of the stations the platforms are of the raised type, level with the coach footboards, as in Great Britain, but owing to the differing dimensions of the passenger and freight stock using the route, a dangerous gap would have been left had the platforms been built to permit freight vehicles to pass safely. The difficulty was met by providing a form of interlaced lines, with hand-operated points at the facing, and spring returned points at the trailing end, enabling freight trains to be diverted sufficiently towards the centre of the railway when passing through stations, as shown on the accompanying diagram, which is based on a description of the signalling in our contemporary *Railway Signaling* for July, 1941. The additional rails are included in the new track circuits, but as they are infrequently used there is a risk of dirt and rust accumulating sufficiently to cause interruption to the shunt, with consequent false action of the signal in rear. Special circuits were therefore put in, as illustrated in the diagram, to insure that vehicles passing over those rails should always be properly protected.



Arrangement for enabling freight trains to clear station platforms, C.N.S. & M.R.

The facing points, which are worked with ground levers by freight train crews, are fitted with disc indicators and four-faced lanterns, common in the U.S.A. Both facing and trailing points are normally set for straight movements and are fitted with normal detecting contacts. In addition, the trailing points have a passing contact, made only in the course of their stroke. The signal *S* in rear of the station is controlled in the usual way by means of an *HR* and a *DR* relay, but the *HR* relay circuit is taken over a front contact on a stick relay *SR*, itself maintained over the detector contact on the facing points, as well as over the ordinary track relay contact. When a freight train requires to pass the station it stops at the facing points, which are reversed by one of the crew, releasing the stick relay and holding signal *S* at red, even though the shunt on relay *TR* should fail while the additional rails are being passed over. When the train passes off them the passing contact on the

(*Continued on page* 235)

IMPROVISED SLEEPERS IN WARTIME

Devices for prolonging the usefulness of wooden sleepers

THE modern railway sleeper, though carefully selected and reliably creosoted, is subject to the destructive influences of the weather (temperature and moisture) and of the large mechanical forces imposed upon it by the rolling loads, by means of the fastenings, the chairs with their screws, spikes, or bolts. Its stability must be secured by embedding it in ballast which allows quick drainage, and by using effective anti-creeping devices. Many sleepers, though sound, tend to split, thus losing strength and reducing the effectiveness of the fastenings; if they were not fitted with anti-split devices before being put into service, these sleepers ought to be provided with these preventive devices later (Fig. 1).

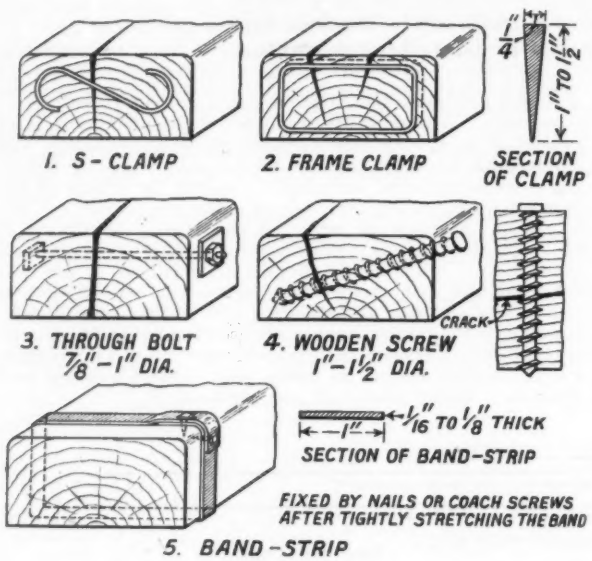


Fig. 1 (above)—Anti-split devices for wooden sleepers

A thorough inspection of more than 140,000 sleepers removed from the tracks of the Atchison, Topeka & Santa Fe System (U.S.A.) showed that 44 per cent. of them had become unserviceable through spike-killing,[1] *i.e.* the fastenings had become loose, rain water had penetrated into the holes causing the formation of rust, and the rusty surface of the fastenings moved by the passing loads had destroyed the walls of the holes and produced decay of the adjoining parts of the sleepers. It is important, therefore, in view of both the upkeep of the sleepers and their function, to make sure that the fastenings are really tight and firm. A modern device for restoring firm anchorage is the Metospir (Fig. 2), a steel band put over the thread of the loosened screw, thus enlarging the effective diameter of the screw. After a time, however, loosening tends to reappear. The simplest method is, obviously, to plug the hole. In some foreign countries this is done either by filling the holes with wooden spikes or, if the diameter of the worn hole is too large, by driving a treated hardwood dowel into the enlarged hole (Fig. 2). In this country and in Australia, it has been common usage in the last few years to fill the worn holes with plastic material after having thoroughly removed loose and rotten parts of of the hole wall, and then to bore new holes in it. In Australia a mixture of tar, pitch, bitumen, kerosene, and sawdust has been found successful, while in this country Philplug, a fibrous asbestos-cement compound, is widely used.[2] This standard method has since proved superior to all other methods formerly used, both in economy and effectiveness. Fig. 3, showing a cross section of a Philplugged sleeper, clearly illustrates the re-fixing of the screws. The old practice of eliminating worn holes by shifting the sleeper a few inches along its own axis, and then boring new holes for the fastenings, has been almost abandoned, because shifting of a sleeper disturbs the stability of the track, and also because drilling of additional holes means weakening of the sleeper. Another method of avoiding spike-killing is the use of through-bolts instead of coach-screws for fixing the chairs. Special design of the bolts and their washers ensures that moisture, resulting in decay, cannot gain access to the bolt holes. The G.W.R. has long used through-bolts exclusively, and they have been adopted as standard practice in relaying on other lines.

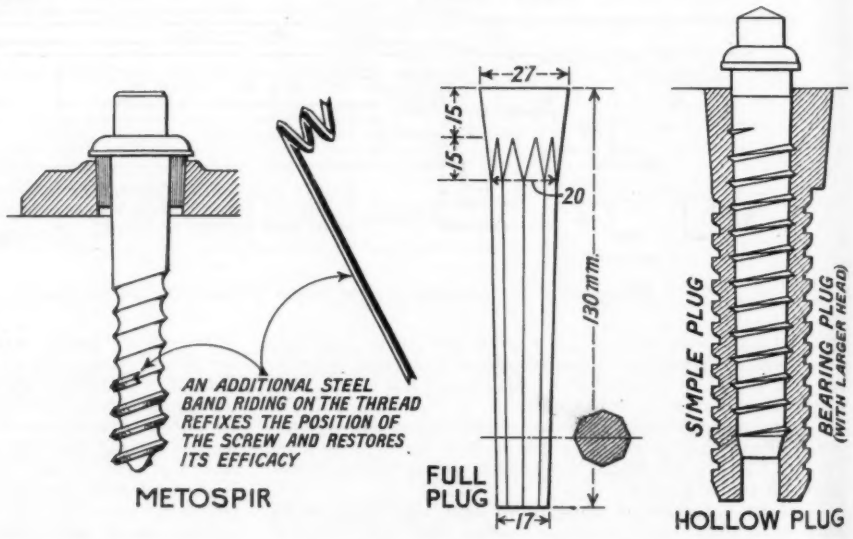


Fig 2 (right)—Devices for refixing loosened screws in wooden sleepers

Where the part of the sleeper which carries the chair, and which is therefore exposed to the heaviest loads, is weakened by adzing and by repeated hole-repairs, it is desirable to strengthen it, and this can be done successfully by saddling it, as shown in Fig. 4. The saddles are cut from old

sleepers. The method is cheap and effective, but the work has to be done by carpenters and in a workshop, not *in situ*. Another way of strengthening the part carrying the chair is the insertion between chair and sleeper of a steel plate which

Fig. 3—Cross section through a Philplugged sleeper, showing refixing of the screws

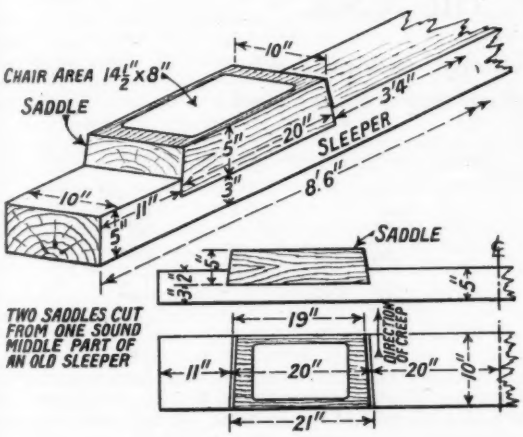
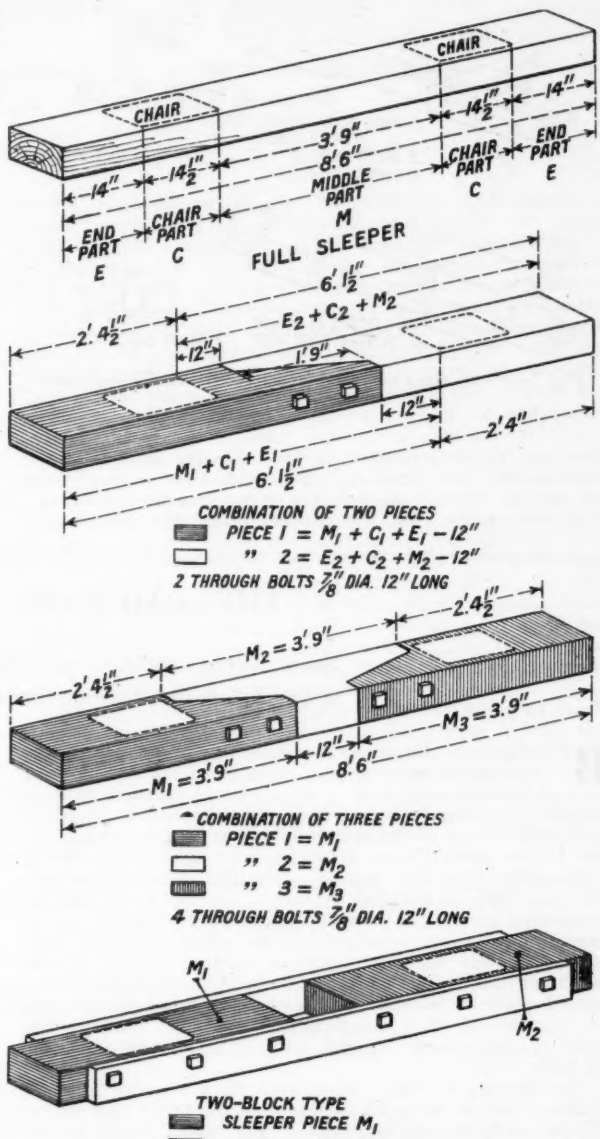


Fig. 4—Saddled sleeper

bridges the weakened part and, moreover, distributes the loads over a wider area of the sleeper, thus reducing the specific pressures below the chair. The plate is fixed to the sleeper by ordinary fastenings (bolts or screws), but the chair should be riveted or welded to the plate. In wartime, new steel plates may be difficult to obtain, but scrap plates cut from old bridge girders serve the purpose well.

When the destruction of the sleeper has advanced so far



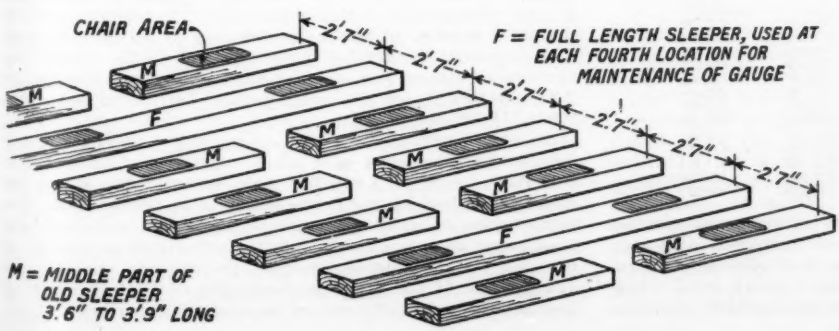


Fig. 5 (left)—Sections of sleepers for use in sidings, and Fig. 6 (above) — variety of compound wooden sleepers

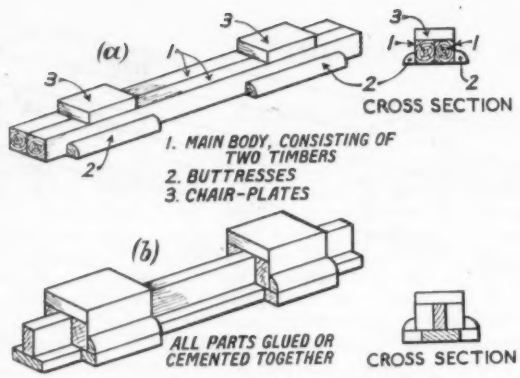


Fig. 7—Compound wooden sleeper constructed from sawn timber

that none of the methods described above is technically and economically applicable, the sleeper must be removed from the track. But as long as parts of it are in good condition, it is wasteful to use the sleeper for inferior purposes as hitherto. As a rule, the middle part of the sleeper is still sound and serviceable, and it is at least this part of 3 ft. 6 in. to 3 ft. 9 in. which ought to be cut out and re-used in sidings where dynamic loads are small. Two of these parts may safely be used instead of a full sleeper, provided one of the latter is inserted as a gauge tie under every fourth pair of chairs (Fig. 5).

There are also many possibilities of producing full-size compound sleepers by joining 2 or 3 sound sleeper pieces together. Specimens are shown in Fig. 6. These sleepers, too, should meet at least the requirements of sidings for some time. Such pieces can be combined to form quite useful point and crossing timbers. Where the principles of plywood production are adopted, it is possible to produce sleepers from treated timber pieces and ordinary boards by glueing or cementing them together, but it does not seem advisable to follow Dr. Baeseler, the well-known German railway engineer, whose patented compound sleeper[3] (Fig. 7) consists of so many components that its technical and economical value is doubtful. Compound sleepers of the kinds mentioned cannot, of course, be produced except in the shops.

[1] *Railway Engineering and Maintenance*, July, 1940
[2] THE RAILWAY GAZETTE, November 11, 1937
[3] *ibid.*, July 5, 1940

THE RAILWAYS OF THE U.S.A.

Some recent statistics of total mileage, multiple tracks, steam locomotives and tractive effort, and rolling stock

BY reason of the extensive land tracts of the North American continent, the railways of the U.S.A. and Canada occupy even more important positions than in smaller countries with extensive coast lines, and therefore the ability to use water transit to a considerable extent. In the U.S.A. the railways are widely and rightly regarded as representing the first line of industrial preparedness and the main line of national defence. The rapid and reliable movement of the products of farms, fields, and forests, of mines, and of mills, is essential to the national welfare. Particular interest therefore attaches to the strength of the American railway industry, and some false impressions have gained currency in certain branches of the popular press by reason of the unintelligent use of statistics of reduced route mileage, smaller totals of locomotive units, and so forth.

On January 1, 1941, there were 233,670 route miles of railway line on the main continent of the U.S.A. (excluding Alaska and overseas territories). This figure represents the total point-to-point length of the various railways, excluding mileage of yard tracks and sidings, and taking no account of double or multiple tracks. The development of this total figure over a period of years is shown in the following table:—

Year	Route mileage	Track mileage
1916	254,037	397,014
1921	251,176	407,531
1926	249,138	421,341
1927	249,131	424,737
1928	249,309	427,750
1929	249,433	429,054
1930	249,052	429,883
1931	248,829	429,823
1932	247,595	428,402
1933	245,703	425,664
1934	243,857	422,401
1935	241,822	419,228
1936	240,104	416,381
1937	238,539	414,572
1938	236,842	411,324
1939	235,064	408,350
1940	233,670	405,975

Of the total track mileage, about 95 per cent. was operated by Class I railways, that is, by those companies with individual operating revenues amounting to $1,000,000 or more annually. The route mileage of main railway track abandoned during the 9-year period from 1932-1940 inclusive (covering all railways, and not only Class I lines), is as follows:—

Year	Miles
1932	1,452
1933	1,876
1934	1,995
1935	1,843
1936	1,523
1937	1,140
1938	1,897
1939	1,783
1940	1,299
Total	14,808

At the beginning of last year the total of steam locomotives in service on Class I railways was 41,721, as compared with 61,332 in 1916, and 64,949 in 1921. In fact, the number of steam engines has steadily reduced annually since 1924, but the total figures of units are comparatively unimportant, and actually misleading, unless related to the increases in power and efficiency and the extension of other forms of traction such as electricity and diesel power. The steam locomotives reductions are accounted for partly by the replacement of old and obsolete engines with new units of greater power and efficiency; by more intensive locomotive user; and by reduced traffic before the outbreak of war. The remarkable progress which has been made in increasing the average tractive effort of steam locomotives in the U.S.A. is indicated by the fact that from 1916 to 1940 the average unit figure has increased from 33,188 lb. to 50,905 lb., an increase of no less than 53 per cent. This 1940 figure is the highest average yet attained. Relating the average tractive effort to the total number of steam locomotives in service, we find, therefore, that the total tractive effort of all the steam locomotives in the service of the Class I railways amounted to 2,038,284,000 lb. at the beginning of 1941, compared with 2,024,118,700 lb. in 1916.

At the beginning of 1941 there were 1,653,663 goods vehicles in the service of Class I railways, an increase over the 1939 figure of 1,650,031; this reversed the downward trend which had existed in the period from 1925 to 1939. The introduction of units of greater capacity, and more intensive equipment user, invalidate direct comparisons of number of vehicles. For example, in 1916 the average capacity per vehicle was 41 tons; by the beginning of 1941 this average had been raised to 50 tons, an increase of 22 per cent.

ON CLASSIFYING LOCOMOTIVES BY SYMBOLS

A suggested system to convey information as to class of locomotive, its power, and the purpose for which it was designed

By ASHLEY BROWN

THE advent of a new numbering system on the Southern Railway raises the question whether any existing system is really satisfactory and how far any existing system can be extended to cover the amalgamated locomotive stocks if, as is at least possible, the companies should be merged into a single national railway system.

Until the advent of the Great Western system during the Churchward *régime*, the numbering of locomotives in this country proceeded in a haphazard fashion. When a freight engine was scrapped its number was quite possibly allocated to a new machine of the express passenger type, and in consequence it was impossible to tell from the number carried by the locomotive either the work for which the machine was intended or its standing in any particular class.

The G.W.R. system, however, suffers from the fact that it is, in effect, a development of a system which at the outset was limited in scope. Admirable as the system is in many ways, it was never contemplated at the outset that it would be expected to do all that it has been made to do. Thus, when the 2-8-0 freight locomotive was given numbers ranging upward from 2800 it is reasonable to infer that it was the intention to render the class number easy to recollect, rather than to indicate the diameter of the driving wheel or the relationship of one class of machine to another; still less did such a question as tractive effort figure in the calculation. With the development of the system many new factors were brought into the equation, with the inevitable result that the G.W. numbering system although neat, is too complicated to be capable of indefinite extension.

The L.M.S. tackled this problem only recently, and in many ways the system is more straightforward than that of the G.W.R. If we take the "Hall" class on the G.W.R., the system of numbering becomes intelligible only when we have grasped the fact that the class is the 49XX or the 59XX and that the number 5000 does not indicate the "Hall" constructed after number 4999 but a machine of an entirely different nature, one of a class in which 0, as a second figure, is a distinguishing sign. On the L.M.S., on the other hand, the Stanier mixed traffic locomotive is numbered continuously from 5000 upwards. This system however still leaves something to be desired, since at 5499 the numbering ceases to refer to a mixed traffic machine and leads to the beginning of a new series allocated to 3-cylinder passenger engines.

On neither the L.N.E.R. nor the Southern is there any system that could be applied with advantage to the many thousands of locomotives now in this country. In fact it does not appear that either company has made any particular effort to classify its machines by means of running numbers. Certainly in so far as the most recent Southern locomotive is concerned the new numbering would not appear to offer any advantage that could not be secured by the system it replaces, 21C1 does not convey more to the mind than 4621. In either case we are informed only that it is a 4-6-2 locomotive and the first of its class. But it is obvious that whether we seek to indicate the class by 21C or (more logically) by 462, we cannot hope to avoid six symbols when, on applying the system to the national stock of locomotives, we find ourselves under the necessity to give a number to, let us say, the 580th locomotive of the 4-6-0 type. Presumably in such circumstances the new Southern designation would be 20C,580, or, on the accepted basis, 460,580. But it is at least doubtful whether the information thus conveyed is worth the paint devoted to it.

Turning to a system capable of national application, there is something to be said for the suggestion that such a system should either confine itself to indicating the running number of the locomotive without regard to any other consideration, or alternatively, that it should afford the fullest information within the smallest compass. It is a disadvantage of the system last mentioned that to be intelligible it presupposes a certain amount of pre-existing knowledge. On the other hand, granted a knowledge of the system of classification, a numbering system which will convey a considerable amount of information without being too cumbersome is a possibility.

The first classification occurring to the mind as applicable to all the locomotives of all the companies is one based upon categories of passenger, mixed traffic, and freight. But for practical purposes such a classification is necessarily vague—there are too many border line cases—and in any event if the system is to be of service it must extend far beyond vague generalities. It is necessary to bear in mind in this connection that the value of the numbering system is less apparent in the running shed than in the office and the office records. The experienced man with the locomotive before him scarcely needs any other indication of its capabilities. From the point of view of the office staff, however, a numbering system that is reasonably informative has a value that will be greatly increased if, as is probable on the unification of the railways, locomotives are drafted far from their parent system. Thus to be of practical value the ideal numbering system will not only indicate the wheel denomination and the number of cylinders but will also give some indication even of the diameter of the driving wheels and the tractive effort.

It is not to be supposed that a system affording so much information can be rendered excessively simple. None the less it can be reduced to symbols no more in number than the 21C1 of the new Southern Pacific type locomotive. The starting point in the compilation of such a system may be found in driving wheel diameter, a factor that can be roughly expressed in the following fashion :—

TABLE I

Driving wheel diameter	Distinguishing symbol
Above 6 ft. 5 in.	×
6 ft. 0 in. to 6 ft. 5 in. inclusive	+
5 ft. 3 in. to 5 ft. 11¾ in. inclusive	–
Below 5 ft. 3 in.	None

To indicate the wheel denomination it is only necessary to apportion the alphabetical symbol, thus :—

TABLE II

Wheel arrangement	Corresponding symbol
4-4-0 } 4-4-2 }	A
0-6-0	B
2-6-0	C
2-6-2	D
4-6-0	E
4-6-2	F
0-8-0	G
2-8-0	H
2-8-2	I
4-8-0	J
4-8-2	K
0-10-0	L
2-10-0	M
Unclassified	Z*

* i.e., Beyer-Garratt locomotives, crane locomotives, etc.

Thus by G– we indicate a 0-8-0 locomotive with driving wheels 5 ft. 3 in. to 5 ft. 11¾ in. in diameter, by D+ we indicate a 2-6-2 locomotive with driving wheels 6 ft. to 6 ft. 5 in. in diameter, by D we indicate a 2-6-2 locomotive with driving wheels below 5 ft. 3 in. in diameter.

As has been suggested above, there would seem to be no reason why the number of cylinders should not also be indicated, the more so since by adding to the class letter a small 2, 3, or 4 in the fashion of an algebraic symbol we can convey this information with a minimum of effort. Thus F^4 × will indicate a 4-cylinder Pacific locomotive with driving wheels exceeding 6 ft. 5 in. in diameter; H^2 – will indicate a 2-8-0 locomotive with two cylinders and driving wheels between 5 ft. 3 in. and 5 ft. 11¾ in. in diameter.

It only remains to afford some indication of the tractive

effort which could be effected to an approximation as follows :—

TABLE III

Tractive effort	Distinguishing symbol
Above 35,000 lb.	5
From 30,000 to 35,000 lb. inclusive	4
,, 25,000 to 29,999 ,, ,, ...	3
,, 20,000 to 24,999 ,, ,, ...	2
Below 20,000 lb. inclusive	1

Thus C^3 3 will indicate a 2-6-0 locomotive with 3 cylinders, with driving wheels below 5 ft. 3 in. in diameter and possessing a tractive effort of from 25,000 to 29,999 lb. per sq. inch.

TABLE IV

Type	As re-numbered	Information conveyed	Actual dimensions
Southern :			
Pacific ...	$F^3 + 5 : 000$	4-6-2	4-6-2
		Three cylinders	3 cyl. 18 in. × 24 in.
		D.W. 6 ft. 0 in. to 6 ft. 5 in.	D.W. 6 ft. 2 in.
		T.E. above 35,000 lb. ...	T.E. 37,500 lb.
" King Arthur "	$E^3 \times 3 : 000$	4-6-0	4-6-0
		Two cylinders	2 cyl. 20½ in. × 28 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 7 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 25,320 lb.
L.N.E.R. :			
" Bantam Cock " No. 3401 ...	$D^3 \leftarrow 3 : 000$	2-6-2	2-6-2
		Three cylinders	3 cyl. 15 in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 27,420 lb.
2-6-0 " K4 "	$C^3 4 : 000$ ...	2-6-0	2-6-0
		Three cylinders	3 cyl. 18½ in. × 26 in.
		D.W. below 5 ft. 3 in. ...	D.W. 5 ft. 2 in
		T.E. 30,000 to 35,000 lb. ...	T.E. 32,939 lb.
2-6-0 " K3 "	$C^3 - 4 : 000$	2-6-0	2-6-0
		Three cylinders	3 cyl. 18½ in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 30,000 to 35,000 lb. ...	T.E. 30,031 lb.
4-6-2 " A4 "	$F^3 \times 5 : 000$ ...	4-6-2	4-6-2
		Three cylinders	3 cyl. 18½ in. × 26 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 8 in.
		T.E. above 35,000 lb. ...	T.E. 35,455 lb.
4-6-2 "A1 "	$F^3 \times 3 : 000$ ...	4-6-2	4-6-2
		Three cylinders	3 cyl. 20 in. × 26 in..
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 8 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 29,835 lb.
L.M.S.R. :			
2-6-0 " 5P4F " ...	$C^3 - 3 : 000$	2-6-0	2-6-0
		Two cylinders	2 cyl. 18 in. × 28 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 6 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 26,288 lb.
4-4-0 "2P " ...	$A^3 \times 1 : 000$	4-4-0	4-4-0
		Two cylinders	2 cyl. 19 in. × 26 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 9 in.
		T.E. below 20,000 lb. ...	T.E. 17,729 lb.
4-4-0 Compound	$A^3 \times 2 : 000$	4-4-0	4-4-0
		Three cylinders	2 cyl. 21 in. × 26 in.
		D.W. above 6 ft. 5 in. ...	1 cyl. 19 in. × 26 in.
		T.E. 20,000 to 24,999 lb. ...	D.W. 6 ft. 9 in.
			T.E. 22,649 lb.
4-6-0 " 5P5F " ...	$E^3 + 3 : 000$	2-6-0	2-6-0
		Two cylinders	2 cyl. 18½ in. × 28 in.
		D.W. 6 ft. 0 in. to 6 ft. 5 in.	D.W. 6 ft. 0 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 25,455 lb.
2-8-0 " 8F " ...	$H^3 4 : 000$ ...	2-8-0	2-8-0
		Two cylinders	2 cyl. 18½ in. × 28 in.
		D.W. below 5 ft. 3in. ...	D.W. 4 ft. 8½ in.
		T.E. 30,000 to 35,000 lb. ...	T.E. 32,438 lb.
G.W.R. :			
4-6-0 " King " ...	$E^3 \times 5 : 000$	4-6-0	4-6-0
		Four cylinders	4 cyl. 16½ in. × 28 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 6 in.
		T.E. above 35,000 lb. ...	T.E. 40,300 lb.
4-6-0 " Castle "	$E^4 \times 4 : 000$	4-6-0	4-6-0
		Four cylinders	4 cyl. 16 in. × 26 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 8½ in.
		T.E. 30,000 to 35,000 lb. ...	T.E. 31,625 lb.
4-6-0 " Star " ...	$E^4 \times 3 : 000$	4-6-0	4-6-0
		Four cylinders	4 cyl. 15 in. × 26 in.
		D.W. above 6 ft. 5 in. ...	D.W. 6 ft. 8½ in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 27,800 lb.
4-6-0 " Hall " ...	$E^3 + 3 : 000$	4-6-0	4-6-0
		Two cylinders	2 cyl. 18½ in. × 30 in.
		D.W. 6 ft. 0 in. to 6 ft. 5 in.	D.W. 6 ft. 0 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 27,275 lb.
4-6-0 " Grange "	$E^3 - 3 : 000$	4-6-0	4-6-0
		Two cylinders	2 cyl. 18½ in. × 30 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 28,875 lb.
2-8-0 " 28xx " ...	$H^3 5 : 000$ ...	2-8-0	2-8-0
		Two cylinders	2 cyl. 18½ in. × 30 in.
		D.W. below 5 ft. 3 in. ...	D.W. 4 ft. 7½ in.
		T.E. above 35,000 lb. ...	T.E. 35,380 lb.
2-8-0 " 47xx " ...	$H^3 - 4 : 000$...	2-8-0	2-8-0
		Two cylinders	2 cyl. 19 in. × 30 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 30,000 to 35,000 lb. ...	T.E. 30,460 lb.

At this stage a classification on this principle of some well-known locomotive types may assist to indicate the possibilities and limitations of the proposed system. A difficulty necessarily lies in the discrepancy occasionally to be found between nominal tractive effort and actual power. It is presumed, however, that the symbol based in the first instance upon nominal tractive effort would be modified up or down to conform with the actual efficiency or otherwise of the class concerned. Necessarily, however, the symbol would be applicable to the class and would not vary as between one locomotive and another of precisely the same design. As the running number of any particular locomotive under a national regrouping is unknown it is indicated in Table IV by 000.

The application of this system to tank locomotives is complicated by the fact that we are immediately confronted by a variety of wheel denominations which do not appear in the corresponding classification of tender engines. It is true that the trailing axles of the tank, more often than not, are required merely for the carriage of coal and water ; but this is scarcely a factor of which a straightforward system of numbering could take account. It would appear necessary, therefore, either to create classes additional to those allocated to tender engines or, in some fashion, to adapt the existing tender classification to meet the difficulty.

The following wheel denominations of tank engines in general use are additional to the list in Table II :—

TABLE V

0-4-4	2-6-4
0-6-2	0-8-4
0-6-4	

It is unnecessary to state a case against an increase in the number and variety of the symbols already suggested if such an increase can be avoided ; in practice therefore the most satisfactory method of legislating for the additional classes with which we are now concerned would appear to lie in incorporating them in the existing table without addition to the existing symbols. Fortunately this conjuring feat is less difficult than it would appear to be, since we have merely to base our classification upon the sole advantage of the tank—

TABLE VI

Type	As re-numbered	Information conveyed	Actual dimensions
Southern :			
0-4-4 " O2 "	$TA^3 1 : 000$...	0-4-4 or 4-4-0...	0-4-4
		Two cylinders	2 cyl. 17½ in. × 24 in.
		D.W. below 5 ft. 3 in. ...	D.W. 4 ft. 10 in.
		T.E. below 20,000 lb. ...	T.E. 17,245 lb.
0-8-0 " Z "	$TG^3 3 : 000$...	0-8-0	0-8-0
		Three cylinders	3 cyl. 16 in. × 28 in.
		D.W. below 5 ft. 3 in. ...	D.W. 4 ft. 8 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 29,376 lb.
2-6-4 " W "	$TF^3 - 3 : 000$...	4-6-2 or 2-6-4	2-6-4
		Three cylinders	3 cyl. 16½ in. × 28 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 6 in.
		T.E. 25,000 to 29,999 lb. ...	T.E. 29,452 lb.
L.N.E.R. :			
0-6-2 " N2 "	$TC^3 1 : 000$	2-6-0 or 0-6-2...	0-6-2
		Two cylinders	2 cyl. 19 in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. below 20,000	T.E. 19,945 lb.
0-6-2 " N7 "	$TC^3 2 : 000$...	2-6-0 or 0-6-2...	0-6-2
		Two cylinders	2 cyl. 18 in. × 24 in.
		D.W. below 5 ft. 3 in. ...	D.W. 4 ft. 10 in.
		T.E. 20,000 to 24,999 lb. ...	T.E. 20,512 lb.
2-6-2 " V1 "	$TD^3 - 2 : 000$	2-6-2	2-6-2
		Three cylinders	3 cyl. 16 in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 20,000 to 24,999 lb. ...	T.E. 22,464 lb.
L.M.S.R. :			
2-6-2 " 3P "	$TD^3 - 2 : 000$	2-6-2	2-6-2
		Two cylinders	2 cyl. 17½ in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 3 in.
		T.E. 20,000 to 24,999 lb. ...	T. E. 21,486 lb.
2-6-4 " 4P " (3 cyl.)	$TF^3 - 2 : 000$...	4-6-2 or 2-6-4...	2-6-4
		Three cylinders	3 cyl. 16 in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 9 in.
		T.E. 20,000 to 24,999 lb. ...	T.W. 24,600 lb.
2-6-4 " 4P " (2 cyl.)	$TF^3 - 2 : 000$...	4-6-2 or 2-6-4...	2-6-4
		Two cylinders	2 cyl. 19⅜ in. × 26 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 9 in.
		T.E. 20,000 to 24,999 lb. ...	T.E. 24,670 lb.
G.W.R. :			
2-8-2 "72XX"	$TI^3 4 : 000$ ...	2-8-2	2-8-2
		Two cylinders	2 cyl. 19 in. × 30 in.
		D.W. below 5 ft. 3 in. ...	D.W. 4 ft. 7½ in.
		T.E. 30,000 to 35,000 lb. ...	T.E. 33,170 lb.
2-6-2 "45XX"	$TD^3 2 : 000$...	Two cylinders	2-6-2
		D.W. below 5 ft. 3 in. ...	2 cyl. 17 in. × 24 in.
		T.E. 20,000 to 24,999 lb. ...	D.W. 4 ft. 7½ in.
			T.E. 21,250 lb.
2-6-2 "61XX"	$TD^3 - 3 : 000$	2-6-2	2-6-2
		Two cylinders	2 cyl. 18 in. × 30 in.
		D.W. 5 ft. 3 in. to 5 ft. 11½ in.	D.W. 5 ft. 8 in.
		T.E. 25,000 to 29,999 ...	T.E. 27,340 lb.

the fact that it can run in either direction with almost equal facility. In short, when we are concerned with the tank engine it should not matter if we give it the double classification of 0-4-4 and 4-4-0, since in practice it will run sometimes as the one and sometimes as the other.

We can, therefore, readily throw open Table II to the tank upon the understanding that the wheel denomination may read in either direction and that this fact is intimated by T placed before the appropriate alphabetical symbol. Table VI gives a classification upon this principle of some tank engine classes in general use, the letter T being used to signify tank locomotive.

Bearing in mind the difficulty necessarily attaching to any attempt to distinguish between one locomotive class and another within the small compass of three or four symbols the suggested system is possibly more informative than might be anticipated. The classes of locomotive included in Table IV are in many instances so similar in certain broad essentials that the ability of the system to pick out one from the other is almost surprising. It will be seen for instance that the 2-6-0s, three in number, all fall under different symbols, and that the seven 4-6-0s carry six different classifications. Had the types been chosen to that end, the number could, of course, have been greatly increased. However it was not the intention of the table to make a case either for or against the suggested system, but merely to illustrate by means of a few casual examples both its limitations and its advantages.

It may be objected that this system fails to take account of possibly the most important of all practical considerations, maximum axle weight. But in view of the very practical system of colour indication already in force on the G.W.R., there would seem to be no reason for adding to the symbols already brought into use. We may remember that in current G.W. practice the yellow, blue or red disc, indicating the stretches of line over which a particular locomotive may run, is placed on the cab side and is additional to the G.W.R. system of numbering. There would appear to be no reason why this most practical system should not be extended to cover Great Britain, since all lines are amenable to the same classification.

In conclusion, it may be said in favour of the numbering system outlined above that it enables an unlimited number of locomotives to be consecutively numbered and placed in the same class. Further, however many the locomotives in any one class, they do not swell the running numbers of any other class. Each class is distinct and may, if necessary, include its own sub-divisions, *i.e.*, a minor variation in $E^2 + 3 : 001$ might reasonably commence with $E^2 + 3 : 501$. As against the proposed system may be placed the inevitable complication and the initial difficulty of carrying in the mind the significance of the various symbols. None the less, should the companies lose their identities the existing numbering systems will necessarily undergo some modification and the only point at issue will be the nature and extent of the change. In short, in such circumstances complications and temporary difficulties cannot well be avoided.

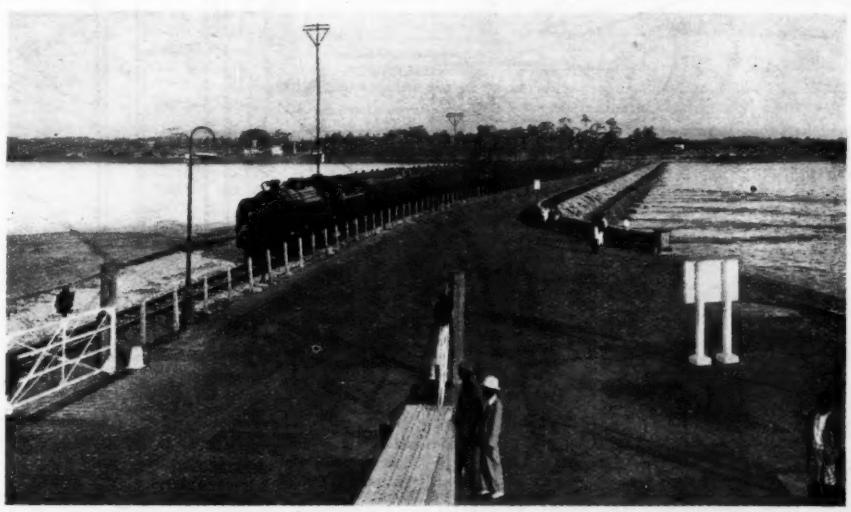
(*Editorial comment is made on page* 219)

A PECULIAR TRACK AND TRACK CIRCUIT LAYOUT—(*continued from page* 229)

trailing spring points will re-energise *SR*, provided that the facing points have been correctly restored to normal behind the movement, the feed for the pick-up circuit being taken from the detector contact on the latter points. The trailing points must duly return to normal when the movement has ceased or the feed to the *HR* relay circuit remains broken. These circuits would not, of course, afford protection against a vehicle being left behind on the additional rails and failing to shunt, but no doubt this is not considered necessary and may, in practice, be disregarded.

The signals in this new work have no background plates, to enable them to be set as close as possible to the track, giving a clear view unobstructed by the overhead wire supports. The last-named are of the arch-shaped girder type, and may carry at one side a pole which is used for communication circuits.

Express Train Crossing the Singapore Causeway



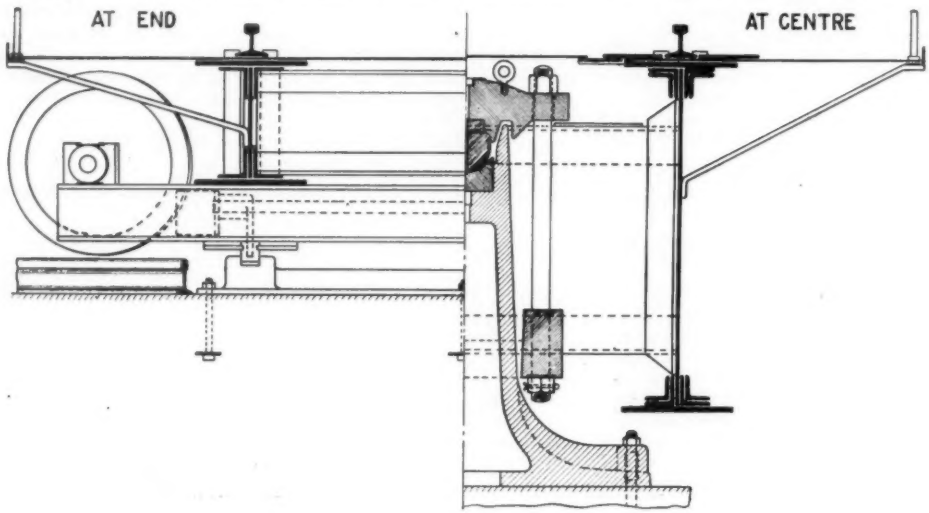
Singapore–Penang express train passing over Johore Causeway which connects Singapore Island with the Malay Peninsula. This was breached on January 30

RECENT TURNTABLE IMPROVEMENTS ON THE N.W.R., INDIA

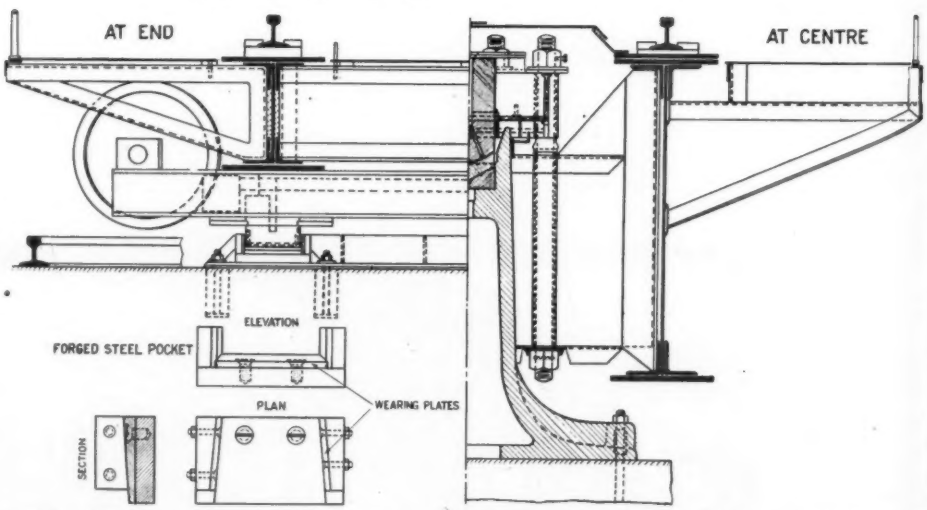
To enable longer and heavier engines to be turned, some of the older turntables, up to 60 ft., have been lengthened and substantially modified to facilitate manual turning and maintenance

(From a Correspondent)

WITH increasing lengths and weights of locomotives in India, it has been found necessary to lengthen a number of the older turntables to accommodate them, and, at the same time, the tables and their bearings have been considerably modified so that (1) the heavier engines shall not impose an undue strain on the staff having to turn them by hand, and (2) their maintenance shall be facilitated.



Left : Sections of turntable prior to modification



Right : Sections of the same table as now modified. Note also the new locking pockets with adjustable wearing plates

One of these turntables is illustrated in section, (*a*) in its original form, and (*b*) as now modified. In the original form, two mild steel diaphragms connecting the main girders, rest on a casting, which in turn is suspended from the lower nuts of eight hanger bolts, thus transferring the whole weight of the table to a cap or saddle casting housing the ball pivot; the bolts are set in a circle around the pedestal. Both top and bottom castings are, generally, of cast steel, but in some of the older tables they are of cast iron. The pedestal houses a steel cup in which the ball pivot rests. The radius of the cup is greater than that of the ball, so the surface in contact is not large. The surfaces of the cup and ball are case-hardened, but wear under the full weight of the engine and table is heavy. When in London in 1939, the author had occasion to discuss this arrangement with the engineers of a leading firm making turntables, but their explanation that wear was to be expected, and that it was usual to renew the cup and ball when the point of contact exceeded the size of a penny, seemed unsatisfactory.

Pivot Bearing Modifications

In modifying the tables, the ideal would have been to introduce ball-bearings, preferably below the ball-and-socket pivot; but expense, the difficulty of inserting a ball race in the confined space inside the pedestals (which it was desir-

able to retain), and war conditions confined the improvements to the simplest possible within the limits of facilities at present available in India. Accordingly, the original pedestal has been bored out to receive a steel cup machined on top to fit the conical bottom of a floating phosphor-bronze bearing. The steel ball is made to bear all over the top of this bearing, which is machined concave to the exact radius to receive it. With a 9-in. diameter bearing, the pressure on the phosphor-bronze on a 75-ft. table is kept below 3 tons to the sq. in.

The cap or saddle casting has been replaced by a cap of mild steel plates electrically welded, and designed so that the hanger bolts are set in two rows of four. The lower casting is no longer necessary, as the bolts are aligned to fit down through pipe stiffeners, which form part of the welded diaphragms joining the main girders. A frequent source of trouble on tables of the old design is the automatic slackening off of the top nuts of the hanger bolts, resulting in cracked cap castings. Both top and bottom nuts are now locked.

Lubrication of the pivot is by grease gun, and the whole is immersed in a bath of oil. A ring from the cap projecting below the surface of an outer oil-bath, around the outside of the pedestal, acts as an efficient dust trap.

Improvements in the Race Wheels, Wedges, and Locking-Pockets

Attention has also been paid to the race wheels. Originally, these were pinned to the axles—a set screw penetrating into a dimple, made a weak spot in the axle—which rotated in cast iron blocks bolted down to the R.S.B. cross girders. In service the cast iron blocks and the treads of the wheels wore quickly, and any error on the part of the fitter in not aligning the bearings properly resulted in a stiff wheel. The treads of the wheels were turned parallel or cylindrically, and as the wheels are constrained to travel in a comparatively small circle along the race rail, the tread wear is excessive.

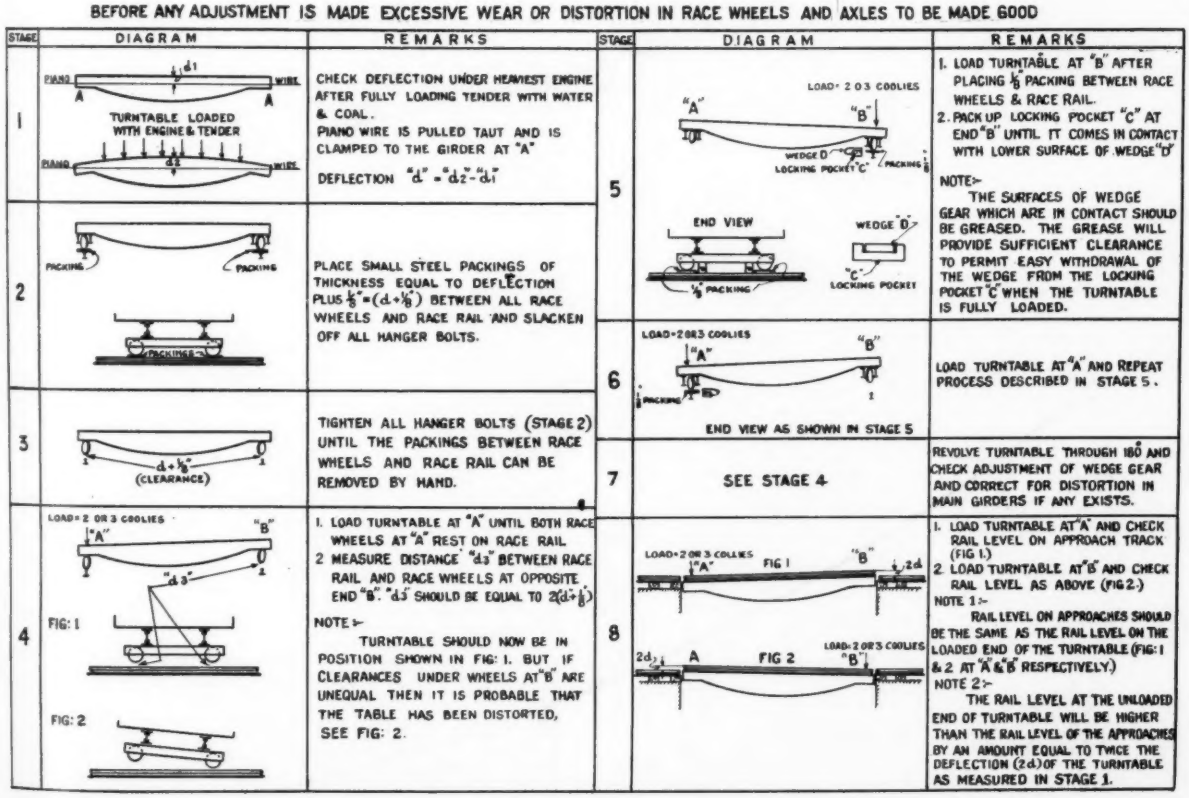
Improvements to race wheels, therefore, include the bushing of the wheels with gunmetal, securing the axles to the cast iron blocks—thus simplifying the fitter's work—and the coning of the treads of the wheels and the planing of the table of the race rail to an inclination of 1 in 28, so that the natural path of the wheels is a circle. The heads of the rails are planed before being bent to the path of the race wheels.

Race wheels and axles have, in the past, suffered acutely from loads far in excess of those for which they were designed. As an engine enters or leaves a turntable, the reaction at the end of the floating table is supposed to be transmitted through the wedges to the locking-pockets and so to the foundations, and the race wheels should be kept clear of the rail when the wedges are " in," but the old locking-pockets of cast iron are small and no provision is made for adjustment to take up wear. Besides, the staff pushing the engine round know that the easiest way of stopping the table is to thrust the wedges into the pockets whilst the table is still in motion. Naturally, this practice which it is impossible to prevent, throws a heavy strain on the pockets, wedges, and foundations. So the race wheels often carry loads normally intended for the wedges and locking pockets.

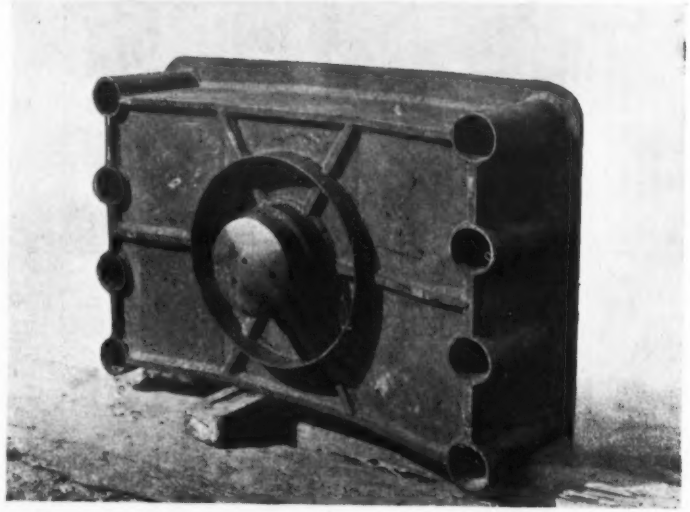
The new locking pockets are of welded mild steel and there are wearing plates which can be packed up or replaced. The bearing area of the wedges has been increased and the pockets anchored to large reinforced concrete foundation blocks. The pockets are made in pairs with a deep vertical plate curving between them so that the wedges cannot be thrown over unless the table is in alignment with the approach road.

One of the accompanying illustrations shows the instructions now issued to those responsible for the maintenance of turntables on the N.W.R. It explains how the adjustments are to be made so that the end reactions are entrusted to the wedges and not to the race wheels.

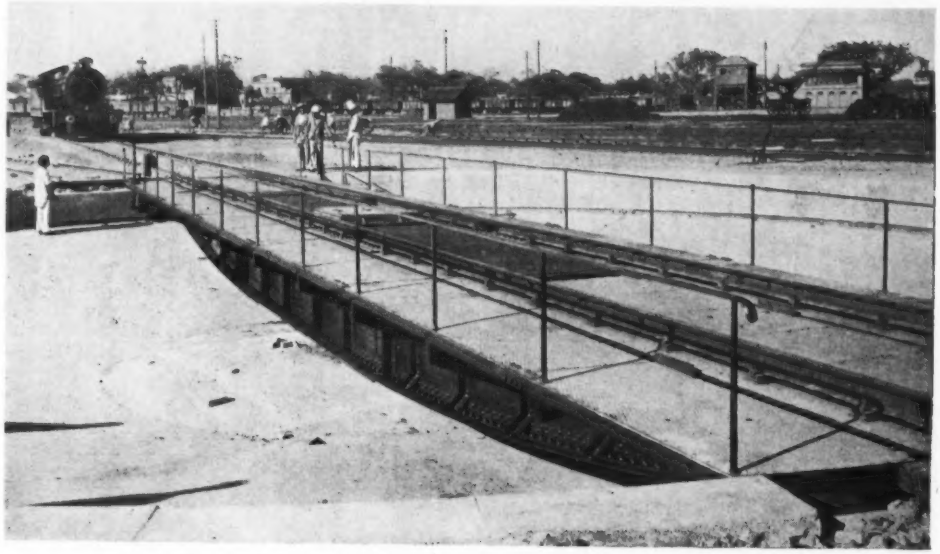
In early designs, little attention seems to have been paid



Sheet of instructions explaining in detail how turntables should be adjusted



Underside of all-welded mild steel cap, showing the case-hardened spherical surface of the ball. Note ring forming baffle in dust-trap oil bath, the low repart of which is shown below



General view of a formerly 60-ft. turntable as modified and extended to 75 ft.

Man holding floating phosphor-bronze bearing which fits over conical cup visible inside the pedestal. Note welded diaphragms and "pipe" stiffeners to house the hanger bolts

Details of decking on above turntable. Note rails and deck plates kept well clear of girders, also open grill of rods welded to angle framework and nuts of hanger bolts locked with set screws
(For description see pages 236–239)

to the maintenance of the steelwork. The space between the diaphragms, castings and girders is too small to allow the insides of the girders to be painted unless the table be lifted off the pivot, a process resulting in the table being out of service for a couple of days, and, therefore, impracticable at most sheds. The chequered plate decking fits tight against the bottom flanges of the rails (or sometimes passes under them) and rests immediately on the top flange plates of the girders. The drippings from engines and tenders are highly charged with corrosive salts, and so conditions are ripe for heavy rusting, particularly on the top flanges under the rails, inside the girders, and along the outer edges of the decking where the vertical legs of the runner angles project up above the floor plate.

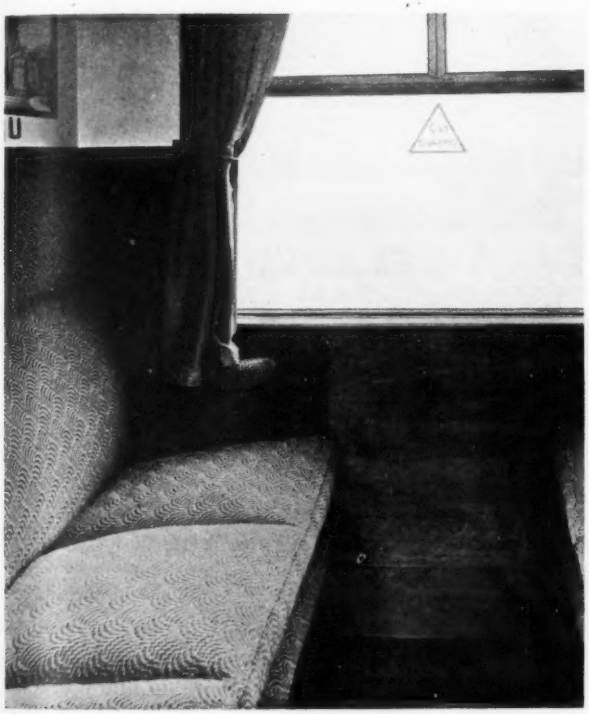
When modifying a table, efforts are made to keep the rails and decking well clear of the girders. The edge runner angles are turned with their vertical legs downwards, and the chequered plates sloped away from the girders. The rails are supported on pad plates sealed all around and welded to the flange plates of the girders. In this way, there is room for the painter's brush to get to the steelwork at a place where rusting is heaviest. Except for a short length at each end of the table, the central chequered plate decking is done away with, and the space either left open altogether or covered with an open grill of rods welded to a frame of angles. This leaves the space exposed to the sun, encourages evaporation, and leaves the inside steelwork open for easy inspection without the necessity for crawling under the girders, a dirty job that is unpopular with inspectors. The pivot is protected with a welded steel cover, hinged to open sideways so that it must be closed if the rails are to be clear for an engine.

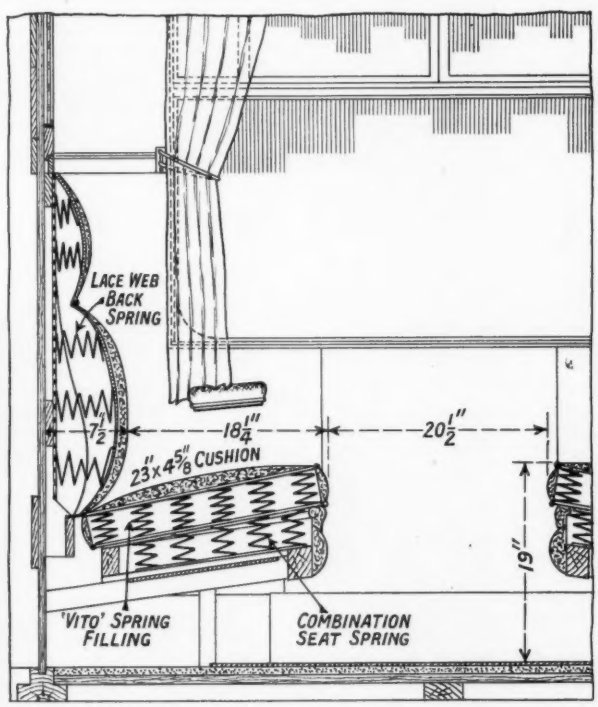
The old arrangement of securing the rails by clips and bolts is retained, but small strips of steel plate welded to the undersides of the bottom flanges so as to butt against two of the pad plates, anchor the rails on the table and prevent longitudinal creep. Prior to this anchoring, it was not unusual to find the rails sliding along the table and striking the ends of the approach rails. (*See also editorial note on page* 218 *and illustrations on page* 238 *opposite.*)

Details of decking on above turntable. Note rails and deck plates kept well clear of girders, also open grill of rods welded to angle framework and nuts of hanger bolts locked with set screws (*For description see pages* 236–239)

Man holding floating phosphor-bronze bearing which fits over conical cup visible inside the pedestal. Note welded diaphragms and "pipe" stiffeners to house the hanger bolts

G.W.R. Third Class Comfort





Interior view, looking towards the outer window, showing seating in the latest standard third class compartment, Great Western Railway; and cross-section indicating the dimensions and arrangement of the comfortable design of seating. ***(See editorial note at page*** 218.***)*** ***In our issue of January 30 we published an illustrated consideration by a correspondent of the principles governing comfortable travel, emphasising the fact that scientifically-designed support for the back of the passengers is one of the first essentials, particularly on long-distance journeys***

L.N.E.R. Lighting and Water Control saves Gas, Water, and Electricity.—At York the L.N.E.R. have a Lighting & Water Control Office, where a staff of seventeen regularly keep under observation the light from every electric lamp, the flicker of every gas jet, and the drip of every tap on the property of the L.N.E.R. Into this office come weekly readings of 10,750 meters and also periodical readings of 5,500 meters registering supplies to tenants and private consumers. Each meter has its own card and the figures are recorded by special posting machines which simultaneously type the readings on to office records and departmental consumption statements, enabling fluctuations in consumption at any consuming point at any period to be readily seen. These fluctuations are inquired into, explanations sought and obtained, suggestions made, and in one way and another since this control office was inaugurated nine years ago, a saving has been achieved of 13½ million units of electricity, 108½ million cu. ft. of gas, and nearly 1,000 million gal. of water.

A REBUILT AMERICAN LOCOMOTIVE

Converted from coal to oil burning

As part of an extensive programme of locomotive modernisation the Missouri Pacific Railway has rebuilt in its shops at Sedalia, Missouri, some light 4-8-2 passenger engines. The locomotives, originally built by the American Locomotive Company, were first placed in service in 1919 and they have now been fitted with longer boilers and larger coupled wheels. The frames have been renewed, provision made for increased wheel spacing, and roller bearings have been applied throughout. The Baker valve motion and rods have been replaced by new Walschaerts equipment, fitted with needle roller bearings and 14 in. dia. piston valves, and the locomotives have been converted from coal to oil burning.

The diameter of the cylinders has been reduced by the introduction of liners, from 27 in. to 26½ in.; the piston stroke, 30 in., remains as before. The mechanical stokers, formerly employed for coal firing, have been removed. The new coupled wheels, which are of the Baldwin disc pattern, are 6 ft. 3 in. dia., an increase of 6 in.; the figure before rebuilding was 5 ft. 9 in. The larger boiler has a total (combined) heating surface of 5,493 sq. ft. as compared with the 5,155 sq. ft. of the original one, and the boiler pressure has been raised from 200 lb. to 225 lb. per sq. in. There has been a reduction in the tractive force from 53,900 lb. to 53,720 lb. as although the steam pressure has been increased, the size of the cylinders has been reduced and that of the coupled wheels enlarged. In working order the rebuilt locomotive weighs without its tender slightly over 165 (long) tons; its weight before conversion was approximately 150 tons. The tender carries 15,000 gal. of water and 5,650 gal. of oil fuel.

Since being placed in service, the reconstructed locomotives have given an excellent performance from the point of view of reliability, high monthly mileage, and the satisfactory handling of modern high-speed trains without introducing excessive stress in either the track or equipment. A notable increase in locomotive availability and mileage have been secured. For example, during the month of June, 1941, seven locomotives of the No. 5321 class made a total of 104,530 miles in passenger service, or an average of 14,930 miles each locomotive. This may be compared with an average of 4,790 miles each locomotive a month before the conversion and reconstruction work, which means that the monthly mileage has been increased over three times. In addition to this class some heavy 2-8-4 engines have been converted to the 4-8-4 wheel arrangement with several altered features of construction and dimensions.

In this case the diameter of the coupled wheels was increased by 12 in., *i.e.*, from 5 ft. 3 in. to 6 ft. 3 in. and the weight of the locomotive without tender from 180 to approximately 199 (long) tons. The firebox heating surface was substantially increased by the addition of a combustion chamber 5 ft. 3 in. in length and equipped with a thermic syphon. At the same time the boiler pressure was raised from 230 lb. to 250 lb. per sq. in. The cylinders dimensions 28 in. by 30 in. remained as before as also did the 14 in. diam. piston valves operated by Walschaerts valve motion, which latter was, however, renewed. It is of interest to note the particulars published by our American contemporary the *Railway Mechanical Engineer* respecting the time expended on the work of converting the engines from 2-8-4 to 4-8-4. Approximately 800 man-hours a day were devoted to the conversion work which included a large number of unit alterations as indicated above. The figures which follow are the average for the first four locomotives rebuilt: calculated in all cases on the basis of man-hours; dismantling, 952 hr., boiler work 8,761 hr., machine shop work 4,691 hr., blacksmith's shop work 2,006 hr., erecting shop work 2,811 hr., pipe and other work 2,647 hr., giving a total of 21,868 man-hours for each engine.

DISCLOSURE OF SCRAP METAL.—The Minister of Works has been given powers, under a new Defence Regulation, to make an Order calling on owners and occupiers of specified categories of premises to disclose any metal suitable for scrap which is on those premises at a specified date. An Order is being drafted which will provide for compulsory returns to be made of all disused machinery, plant, and other types of unwanted metal. The terms of the Order will necessarily be widely drawn, but the Minister wishes to make it clear that there is no intention to take for scrap valuable machinery and plant which must be preserved for use after the war. In particular, machinery and plant belonging to firms that have closed down under concentration schemes will not be requisitioned.

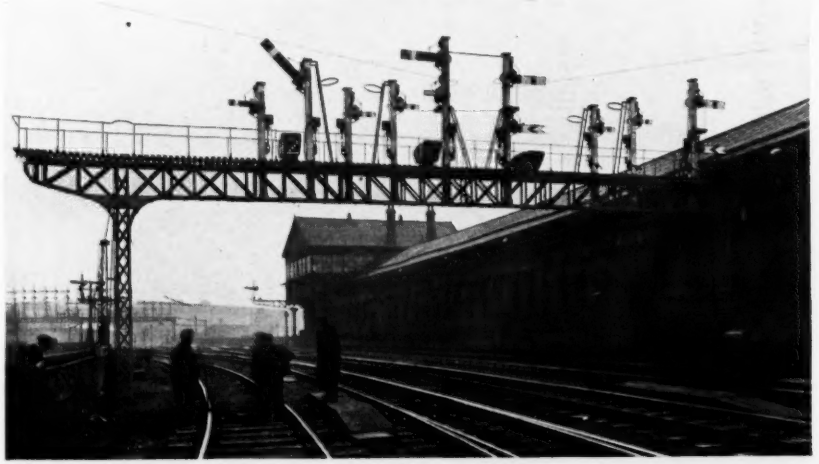
Rapid Erection of a Signal Gantry at Newcastle Central, L.N.E.R.

Rapid Erection of a Signal Gantry at Newcastle Central, L.N.E.R.

10.45 *a.m. on November* 30, 1941

1.35 *p.m. on November* 30, 1941

Noon on December 3, 1941

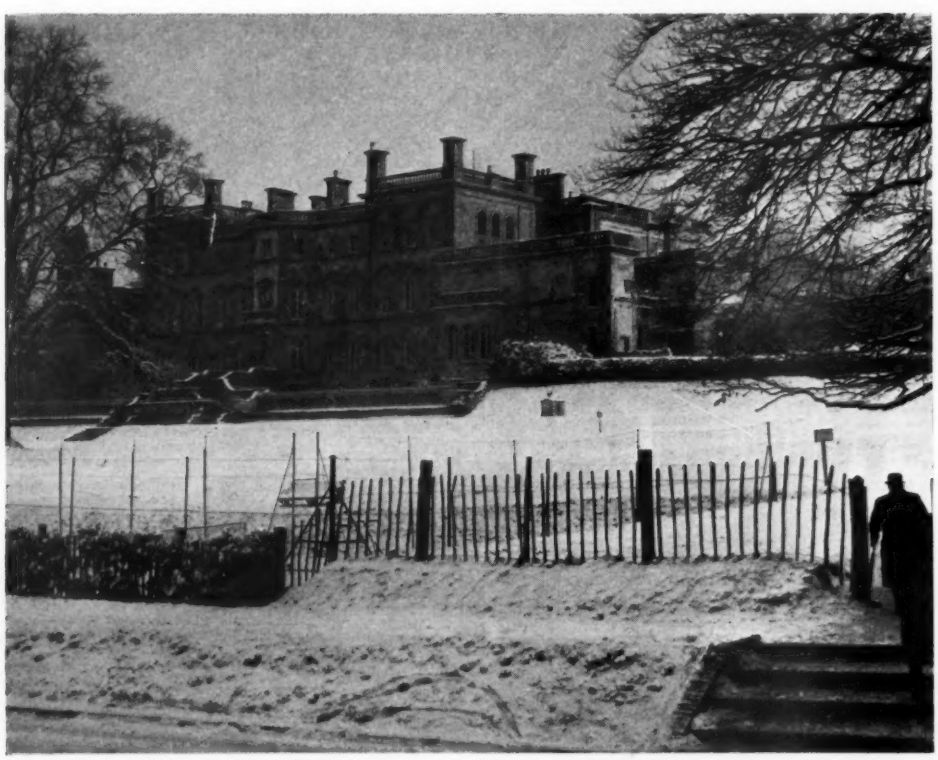


Noon on December 9, 1941

A new signal gantry has recently been erected at Newcastle, L.N.E.R., and, as it was of some size and the erection necessitated the use of two breakdown cranes, a series of photographs was taken showing the work in progress. Four of these are reproduced, and give a good idea of the rapidity with which the task was completed

British Railways and the War—101

Snow has added to the wartime difficulties of the railways, and food and woollen clothing were dropped by an aircraft of Coastal Command, R.A.F. to passengers of an L.M.S.R. train stranded recently between Helmsdale and Wick. Above is shown the relief train and passengers of the snowbound train approaching it



The evacuation headquarters of the Southern Railway Company at Deepdene, Surrey, in winter conditions

GENERAL NEWS SECTION

PERSONAL

The King has approved the following appointments :—

Minister of War Production—The Rt. Hon. Lord Beaverbrook.

Minister of Supply—The Rt. Hon. Sir Andrew Duncan, G.B.E., M.P.

President of the Board of Trade—Colonel the Rt. Hon. J. J. Llewellin, C.B.E., M.C., M.P.

Parliamentary Under Secretary of State for the Colonies—Mr. Harold Macmillan, M.P.

Parliamentary Secretary to the Ministry of Supply—Mr. Ralph Assheton, M.P.

Parliamentary Secretary to the Ministry of Labour & National Service—Mr. Malcolm Stewart McCorquodale, M.P.

Parliamentary Secretary to the Ministry of War Transport—Mr. Philip J. Noel Baker, M.P.

Arrangements are being made for the office of Parliamentary & Financial Secretary to the Admiralty to be divided, and the King has approved that Sir Victor Warrender, M.P., be appointed Parliamentary Secretary and that Mr. George Henry Hall, M.P., be appointed Financial Secretary when the necessary arrangements are completed. A Barony is to be conferred on Sir Victor Warrender.

The Minister of Aircraft Production has agreed that Mr. W. C. Devereux shall relinquish the post of Controller of Repairs, and of American & Dominions Aircraft Supplies so that he may resume control of certain plants producing vital raw materials. Mr. Devereux is the Managing Director of High Duty Alloys Limited and is also a Director and Managing Director of other companies concerned in the supply of raw materials.

INDIAN RAILWAY STAFF CHANGES

Mr. T. S. Sankara, Aiyar, C.I.E., has been appointed Financial Commissioner of Railways in place of Sir Bertie Munro Staig, who has taken up an important position in the Middle East.

Sir Leonard Wilson has been confirmed as Chief Commissioner of Railways.

Mr. E. Dibben has been appointed to officiate as Traction Superintendent, G.I.P.R., as from June 1, 1941.

Mr. J. N. E. Nagle has been appointed to officiate as Deputy General Manager (on special duty), E.B.R., as from October 21, 1941.

The services of Mr. E. B. N. Taylor, V.D., Officiating Chief Engineer, N.W.R., have been placed at the disposal of the Defence Department, as from September 19, 1941.

At the request of Sir Andrew Duncan, the new Minister of Supply, the Chancellor of the Exchequer has loaned the services of Sir William Douglas, an Under-Secretary of the Treasury, to act as Permanent Secretary of the Ministry of Supply. Sir William Brown, who has been acting as Permanent Secretary to the Ministry of Supply, has been given leave of absence.

Mr. G. C. Laughton, C.I.E., until December 31, 1941, Agent & General Manager of the Bombay, Baroda & Central India Railway, has been elected President of the Indian Railway Conference Association for the year beginning April 1, 1942. Mr. Laughton, who was born on January 26, 1887, was educated at Seafield Park College and passed into the City and Guilds Central Technical College, South Kensington. He graduated as A.C.G.I. in 1909. He gained practical experience under the Chief Engineer of the former London & South Western Railway and in October, 1910, was appointed by the Secretary of State for India to be an Assistant Engineer in the Railway Branch of the Indian Public Works Department, now the Indian Railway Service of Engineers. For the next nine years, Mr. Laughton was engaged on survey, construction, and open-line maintenance work on the former Oudh & Rohilkhund (State) Railway, now part of the East Indian system ; during the latter part of this period he was Executive Engineer. He was Personal Assistant to the Chief Engineer from 1919 to 1921 and was then appointed Superintendent of the Kalka-Simla Railway, which position he held until 1925. On transfer to the North Western system, he was appointed Divisional Engineer and, in 1926, was promoted to Divisional Superintendent. For a short time Mr. Laughton was Superintendent of Works and, in 1929, became Deputy-Director of Civil Engineering with the Railway Board, and promoted to be Director in 1931. After a short time as Secretary to the Railway Board in 1932 he was appointed Senior Government Inspector of Railways, Circle No. 7, Madras, with headquarters at Bangalore, the post he vacated to accept that of Deputy Agent to the B.B. & C.I.R. In 1938 he was appointed Agent & General Manager ; he relinquished the position of Agent when be became General Manager of the railway when it was handed over to the Government in January of this year.

Mr. G. C. Laughton, C.I.E.

Elected President, Indian Railway Conference Association, 1942-43

On January 27, at a meeting in the Irish Railway Clearing House, Sir Walter Nugent was unanimously re-elected Chairman of the Irish Railway Clearing House Committee for the year 1942.

THE INSTITUTE OF TRANSPORT
(December, 1941)

The undernamed have been elected Corporate Members :—

Members

Mr. W. T. Christie, Manager, Pretoria City Passenger Transport Department.

Mr. A. C. Lisle, General Manager, Sharpness Docks & Gloucester & Birmingham Navigation Company.

Mr. W. E. Macve, Assistant General Manager, Northern Ireland Road Transport Board.

Mr. D. M. Sinclair, Chief Engineer, Birmingham & Midland Motor Omnibus Co. Ltd.

Mr. R. Veitch, President, Chadwick, Weir & Cia (Argentina), Lda.

Mr. J. S. Wills, Chairman, Crosville Motor Services Limited.

Associate Members

Mr. T. E. Peet, Assistant General Manager & Engineer, Durban Corporation Transport.

Mr. J. F. E. Pye, Managing Director, Pye & Counties Transport Limited.

Mr. D. A. F. Quekett, L.M.S.R.

Mr. C. R. Wreathall, General Manager, Hebble Motor Services Limited.

Mr. J. C. Brunjes, Chief Drawing Office Assistant, Signal & Telegraph Engineer's Department (Southern Area), L.N.E.R., retired on January 3, after 44 years' railway service. He joined the Great Northern Railway in 1898 as a pupil in the Architect's Department, where he remained until 1912, when he was appointed Draughtsman to the Signal Superintendent, the late Mr. W. H. Cannon. From 1916 to 1919 Mr. Brunjes served with the Royal Naval Air Service. In 1933 he was made Technical Assistant under Mr. F. Downes, then Signal & Telegraph Engineer (Southern Area), and in 1936 received, under Mr. A. E. Tattersall, the present Head of Department, the appointment he has just relinquished. Mr. Brunjes is succeeded by Mr. A. F. Wigram also formerly in the service of the G.N.R.

We regret to record the death on January 25, in his 80th year, of Mr. Henry Sutton Timmis, who had been since 1919 a Director of the Liverpool Overhead

Railway Company, and since 1904 a member of the Mersey Docks & Harbour Board. Mr. Timmis was also a Commissioner of the Upper Mersey Navigation. He had been a J.P. for the County of Lancaster since 1893.

Mr. Thomas Francis O'Doherty who, as announced in our issue of February 6, has been appointed District Superintendent, Great Southern Railways, *vice* Mr. Patrick McNamara retired. Mr. O'Doherty joined the service of the former Dublin & South Eastern Railway in 1915 as a clerk at Harcourt Street Goods Depot and after acquiring general station experience was promoted to the Traffic Manager's Office where he was attached to the Operating and Trains Departments. In 1936 Mr. O'Doherty was made Stationmaster at Westland Row, which position he held until his recent promotion.

Mr. T. F. O'Doherty

Appointed District Superintendent, Great Southern Railways

We regret to announce that Mr. Frederick Charles Anker, aged 63, passed away recently after a short illness. Mr. Anker retired in 1940 from the position of District Locomotive Superintendent, L.M.S.R., Nottingham, after holding similar positions at Wellingboro', Skipton, Buxton, Bristol, and Leicester.

We regret to record the death, at the age of 81, of Mr. Robert Darragh, J.P., a well-known figure in railway and business circles in Northern Ireland. Mr. Darragh was for many years in the service of the London Midland & Scottish Railway Company (N.C.C.), and was Traffic Manager for the company at Belfast. Since his retirement about 20 years ago he had acted for the Northern Ireland Government in connection with the recently closed Clogher Valley line. He was a magistrate for Co. Antrim.

Mr. C. H. M. Elwell, Locomotive Running Superintendent (Eastern Section), Southern Area, L.N.E.R., who, as recorded in our January 30 issue, has been appointed to be Acting Assistant Mechanical Engineer (Outdoor), Doncaster, was educated at Haileybury College and at London University, where he took his degree of B.Sc. (Engineering). He was apprenticed in 1906 to the late Mr. James Holden, Locomotive Superintendent of the Great Eastern Railway at Stratford, and subsequently became a Locomotive Running Inspector, a Materials Inspector, and served in the Drawing Office. For two years he was Technical Assistant to Mr. C. W. L. Glaze, Works Manager, and afterwards assisted Mr. A. J. Hill, the Chief Mechanical Engineer, as assistant on special work including the manufacture of munitions at Stratford Works. He was also engaged on work in connection with the Railway Priority Committee, and the allocation of steel to British railways and the extensive purchases of railway materials in America. In 1919 he became District Mechanical Engineer, Norwich District, and was transferred in 1921 to Cambridge as Assistant Divisional Superintendent of Operation. He was appointed District Locomotive Superintendent in 1924. After two years in this position he was transferred, in July, 1926, to Liverpool Street as assistant to Mr. W. G. P. Maclure, Locomotive Running Superintendent, Southern Area, and served in a similar capacity to Mr. I. S. W. Groom and Mr. A. H. Peppercorn, before being appointed in September, 1938, Locomotive Running Superintendent (Eastern Section), Southern Area, the position he now vacates.

Mr. C. H. M. Elwell

Appointed Acting Assistant Mechanical Engineer (Outdoor) Doncaster, L.N.E.R.

Mr. R. H. R. Garraway, Assistant District Locomotive Superintendent, Cambridge, who, as recorded in our January 30 issue, was appointed to be District Locomotive Superintendent, Lincoln, L.N.E.R. entered the railway service with the Great Eastern Railway Company in 1911 as a Premium Apprentice at Stratford; he won the Directors' Scholarship in 1913. He was appointed to Temple Mills in 1916 to take charge, on the night shift, of munition work being done there. On completion of this work he went to Egypt where he served in the R.O.D. (R.E.) and on his return in 1920 he went to Stratford Works and then to Woolwich Arsenal to supervise the repairs being undertaken to Great Eastern engines. When this work was completed he went to Doncaster in connection with the special investigation into hot boxes on coal wagons. In 1921 he was appointed Locomotive Depot Superintendent at Peterborough East and, in 1924, became Assistant District Locomotive Superintendent, Cambridge, where he remained until his present appointment at Lincoln. Mr. Garraway is an Associate member of the Institution of Civil Engineers and Associate member of the Institution of Locomotive Engineers.

Mr. John McKenzie, District Superintendent, L.N.E.R., Glasgow, whose death on January 7 we recorded in our issue of January 16, was 55 years of age, and entered the service of the old North British Railway in 1898. He was appointed Chief Assistant to the District Superintendent, Glasgow, in 1919, and District Superintendent in 1932. Mr. McKenzie represented the L.N.E.R. on the Glasgow Port Emergency Committee, and was Chairman of the Bo'ness Port Emergency Committee. He was also a J.P. for the County of the City of Glasgow.

The late Mr. John McKenzie

District Superintendent, Glasgow, L.N.E.R., 1932-42

Mr. J. A. Frampton, District Locomotive Superintendent, Lincoln, who, as recorded in our January 30 issue, has been appointed District Locomotive Superintendent, King's Cross, L.N.E.R., was educated at Sherborne and entered the G.N.R., Doncaster Works, as a Premium Apprentice in September, 1902. On completion of his apprenticeship he was transferred to Peterborough in July, 1908, to obtain shed fitting and firing experience, and in July, 1912, was promoted to Junior Assistant to the District Locomotive Superintendent, King's Cross, and in November, 1913, was placed in charge of Hatfield Locomotive Shed. From January, 1917, to September, 1919, he served in the Royal Engineers in France. In October, 1919, he was transferred to Bradford as Depot Superintendent, and in August, 1930, was promoted to Assistant District Locomotive Superintendent, Stratford. In April, 1932, he was appointed District Locomotive Superintendent at Norwich and in June, 1935, District Locomotive Superintendent, Lincoln.

TRANSPORT SERVICES AND THE WAR—127

Ministry of War Transport road haulage scheme — Success of staggered hours in East London—The O.P.M. in the U.S.A.—Freight rates in Canada—Handling increased traffic on the Burma Road

The London Area Office of the Ministry of War Transport, Road Haulage Branch, located at Kelvin House, Lower Belgrave Street, London, S.W.1 (Telephone: Sloane 9641), began operations on Monday, February 2. Other area and sub-area offices of the scheme will be at Cambridge, Bristol, Cardiff, Swansea, Plymouth, Birmingham, Nottingham, Liverpool, Manchester, Leeds, Hull, Sheffield, Newcastle-upon-Tyne, Glasgow, Edinburgh, and Dundee. These will be opened on Monday, February 16. The corresponding offices of the Minister's agents, the Hauliers' National Traffic Pool, will open on the same dates.

The call up of vehicles accepted for the chartered fleet will begin on Monday, March 2. These vehicles will be called up as required, over a period, after adequate notice to owners. Vehicles already offered should continue their normal work until called. The number of vehicles offered has by no means reached the total ultimately required, however, and the Minister of War Transport hopes that hauliers will not delay in offering further suitable vehicles.

Mr. C. A. Birtchnell, the Head of the Road Transport Division of the Ministry is in general charge of the scheme. He is assisted by Mr. C. Barrington and Mr. P. J. R. Tapp, Deputy Directors of Road Haulage.

Flattening London's Peak-Hour Transport Curve

As transport undertakings have no control over the hours at which their passengers travel to work, the sharp traffic peaks can be reduced only by the co-operation of industrial undertakings. This desirable objective has so far proved unobtainable in peacetime, but now, under Government inspiration and pressure, some measure of success is being achieved. A large degree of co-operation has been obtained in the area covered by the London & South Eastern Regional Board, and we are indebted to *The Times* for the following particulars and diagrams.

This board, which is composed of representatives of the Government departments concerned with production and of employers and workers, consulted the Ministry of War Transport and the transport undertakings and decided that in all important industrial districts in the London area local bodies should be established to cope with traffic problems; 35 groups were formed. They represent the management and workpeople of about 1,000 firms, associated with which are, of course, representatives of the transport undertakings, as well as factory inspectors and welfare officers. Much depends on the energy of the group leader, who is always one of the management members. Today 22 " staggered hours " schemes are in force, and 225,000 workers are affected. Firms which were asked to vary working hours submitted the proposals to the workpeople, and in many cases the majority in favour of the experiment was substantial. It was recognised that an earlier beginning of work, especially in winter, would require domestic rearrangements that might appear awkward. There were, however, compensations in less waiting time for buses, less crowding in the vehicles, quicker journeys, greater safety, and less fatigue.

Instead of the former rush to " clock-in " at 8 a.m., work has been so rearranged that the workpeople are due to start at quarter-hour intervals from 7 a.m. to 8 a.m., while those who formerly arrived at 8.30 a.m. or 9 a.m. are timed in from 8.15 onwards. As the length of the shifts is unchanged, the demand for transport is spread in the evening as in the morning. The accompanying diagrams show that in one East London group no change has been made in the 7 a.m. arrivals, but that 3,000 now are due at work at 7.15, whereas none formerly arrived at that time; 2,514 at 7.30 in place of 5,514; 3,556 at 7.45 in place of 56; 2,067 at 8 o'clock in place of 6,337; 870 at 8.15, which is a new time for beginning; and 900, as before, at 8.30 a.m.

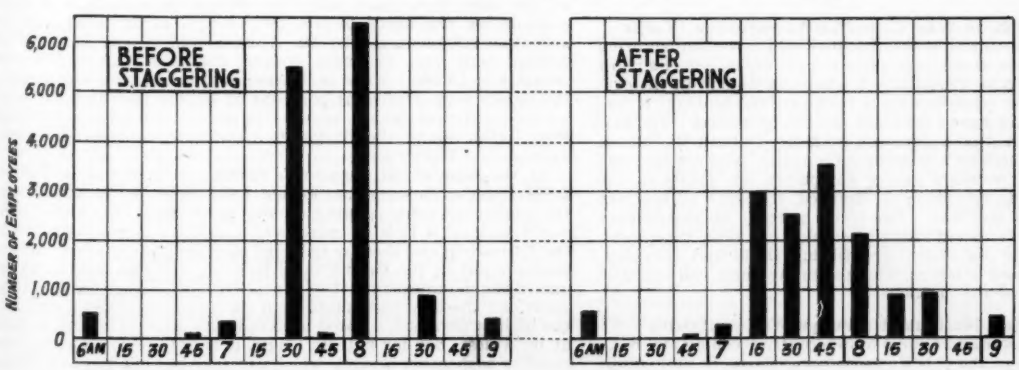
There is an expectation of extending these plans still further in industry, and from industry to commerce. The concentration of inner London traffic is shown by the calculation that at underground stations in the central area there is a total arrival in one morning period of 15 minutes of 26,000 persons, whereas the number for the preceding 15 minutes is 15,000. From the same stations at night there is a departure in one period of 15 minutes of 35,000 persons, and half an hour earlier scarcely half as many.

Having been invited by the Ministry of War Transport to consider ways and means of improving traffic movements, the London Chamber of Commerce has suggested a form of " staggering " hours to large firms and blocks of offices where more than 500 are employed, in the City, in Holborn, and in Westminster. We may say that, since the outbreak of war, the office hours of THE RAILWAY GAZETTE and associated papers have been adjusted during the winter months to include an odd quarter-of-an-hour. As many schoolchildren require transport, congestion is relieved when schools open at 9.15 or 9.30 a.m.

We refer editorially to this subject at page 217.

The U.S.A. Office of Production Management

It has been speedily recognised in the United States that war will involve increased demands upon all forms of transport, particularly railways, and that it will be necessary to set up advisory committees to work closely with governmental agencies. On December 12, more than 200 representatives of the railways and railway equipment and supply industry, including the Association of American Railroads, the American Short Line Railroad Association, carriage & wagon and locomotive builders and speciality manufacturers, and representatives of the Office of Production Management (known familiarly as O.P.M.) met in Washington, D.C. The Chairman of the meeting was Mr. Andrew Stevenson, Chief of the Transportation, Automotive, & Farm Equipment branch of O.P.M., and others attending it included Mr. William S. Knudsen, Director General, O.P.M.; Mr. Donald M. Nelson, Executive Director of the Supply, Priorities, & Allocations Board, and Director, Priorities Division, O.P.M.; Mr. W. L. Batt, Director, Division of Materials, O.P.M.; Mr. Joseph B. Eastman, Chairman, Interstate Commerce Commission; and Mr. Ralph Budd, Transportation Commissioner, Advisory Commission to the Council of National Defense. Mr. Stevenson stated that his department was trying to ascertain the numbers of locomotives and rolling stock required, those that can be scheduled, the capacities of builders, and the amount of materials involved in these particular requirements. Mr. Ralph Budd gave an outline of the specific railway programme from the beginning of the U.S.A. war effort, which included many interesting facts, such as the dismantling of old equipment, the prolonging in service of equipment normally retired,



Left: Diagrams showing the striking effect of staggered hours of work on one East London group of factories

and rebuilding of obsolete or partly worn equipment. Mr. Budd included not only rolling stock, but also track in his remarks. At the conclusion of his survey Mr. Budd summarised the things that should be done at once. These included (*a*) the acquisition of new equipment with the minimum expenditure of men and materials; (*b*) the distribution of orders among builders to develop the maximum output of the car building plants, which will be fixed at 168,000 cars a year; (*c*) the ironing out of seasonal peaks in traffic; and (*d*) the reduction of essential rail inventories, made possible by the use of detector cars. Other matters for consideration included changes in specifications to cover critical materials and the standardisation of equipment. Mr. Budd said that the railways had agreed on a minimum number of standard types of cars, and had also agreed not to introduce any new type of car or locomotive during the present emergency, except such special type as might be necessary to handle war material.

Mr. Eastman emphasised that adequate maintenance was essential to efficient railway service, which in itself was essential to national defence. The problem was to determine what was necessary, in amount and the kind of material, for adequate and economical maintenance. Railways unable to fulfil necessary work would be able to get priority or embargo orders from the I.C.C., but it was hoped to avoid this as it might cause interruption to normal commerce and industry.

The shortage of steel plates and the allocation system was the question taken up by Mr. Charles E. Adams, who explained that the O.P.M. is interested primarily in supplies for essential war services, and secondarily in assisting companies to get materials, rather than in allocating them. So far as the railways can get their materials without allocation, the Government does not want to take over this task.

In the discussion that followed, representatives of locomotive builders and other railway supply companies stated that they were prepared to deliver the equipment required by the railways if the materials were allocated in time.

Mr. Stevenson, in concluding the conference, said that the O.P.M. had not received the co-operation from the railways he expected regarding maintenance of way problems. Requirements for 1942 have not been stated clearly, and careful thought must be given to this and other problems by the railway companies.

U.S.A. Preference Rating Order P-100

The O.P.M. Division of Priorities has issued a new order relating to repair, maintenance, and operating supplies, to be known as Preference Rating Order P-100. This order takes the place of, and revokes, Order P-22. Railways remain among the industries eligible under the plan for priority assistance for obtaining maintenance and repair materials.

O.P.M. Organisation Change

The Automotive, Transportation, & Farm Equipment Branch of the U.S.A. Office of Production Management, which handles materials for railway equipment and supplies, has in future to report direct to the O.P.M. Director General, Mr. William Knudsen, and to the Associate Director, Mr. Sidney Hillman. The branch was formerly under the direction of Mr. Leon Henderson, Director of the O.P.M. Division of Civilian Supply. This change, which also affects other branches of industry, is designed to expedite war production.

U.S.A. Motorcar Plants for War Work

To expedite the conversion of the great U.S.A. motor industry to the production of aeroplanes, tanks, and other materials for war, Mr. Donald M. Nelson, Chairman of the new U.S.A. War Production Board, ordered the manufacture of passenger motorcars and light lorries to be stopped entirely from February 1. The temporary unemployment is estimated by labour leaders at 350,000 men and women. The Government has arranged, however, to pay a subsistence allowance up to $24 (say £6) a week to persons thus deprived of work, provided that they accept training in munition manufacture.

Munition Manufacture in Canadian Locomotive Works

The Montreal Locomotive Works Limited, which is manufacturing tanks, marine engines, shells, and other war products, kept its plant and offices open on New Year's Day for the first time in its history. While many workers stayed away to celebrate the holiday, it was reported that all branches of the plant were in operation. The new policy was inaugurated on instruction from Mr. Duncan W. Fraser, President of the American Locomotive Company, who issued a call for all officials and workers in the company's six plants in the United States and its subsidiary in Montreal to forego all holidays for the duration of the war. The letter asked "all department heads to make a determined effort to employ our skill, manpower, and facilities to the maximum by utilising shifts and overtime, including Sundays and holidays, where such measures will expedite the completion of defence contracts."

More Canadian National Railways War Activities

Some additional facts and figures were recently given by Mr. R. C. Vaughan, President of the C.N.R., concerning the work and equipment of that system to meet the abnormal rush of wartime traffic, which had already risen to 95 per cent. above the pre-war figure and exceeded that of the last war by 60 per cent. To meet the increase, numbers of locomotives and freight cars had been ordered, but due to war priorities, only 10 engines and 1,136 cars had been delivered, leaving 70 locomotives and 3,339 cars still undelivered. Some 4,000 employees had, he said, already enlisted in the Forces. Over 1,000 more were employed on munitions.

At the dry dock and shipbuilding yard of the railway, minesweepers and cargo vessels had been built for Wartime Merchant Shipping Limited, and the railway had constructed, under arrangement with the Government, a building for National Railways Munitions Limited, and the plant had been in operation for some time.

Freight Rates in Canada

The Wartime Prices & Trade Board has ruled that, under price stabilisation regulations, the highest freight and express rates to be charged for shipments by rail will be those prevailing under the normal freight structure established under the jurisdiction of the Board of Transport Commissioners of Canada. No increases in such rates may be made without the concurrence of the Prices Board. Temporary or special rates lower than the basic level of rates, such as those on seasonal goods and those set at competitive levels with rates for water-borne traffic and roadmotor lorries, will continue to apply in the same circumstances and seasons as in the past. Summer rates which normally expire on November 30 do not apply during the winter season, but will be re-established in the spring. The Transport Commissioners will continue to exercise their jurisdiction, including the approval of rate changes. Increases in any rate above that which prevailed under the basic rate structure in 1941, however, will require the concurrence of the Wartime Prices Board.

Similar principles will be observed in connection with railway passenger traffic rates.

Increased Traffic on the Burma Road

Recent messages from Chungking indicate that, by the beginning of the present month, the transport capacity of the Burma Road had been increased to 30,000 tons a month, and that 5,000 lorries are in regular service, about 500 of them unloading daily at Kunming, the Chinese terminus. It is emphasised that these figures do not include lorries belonging to the Chinese Army and other Government organisations.

Behind this simple statement there is an interesting story which began in the spring of last year. As we recorded at page 654 of our June 13, 1941, issue, only about 40 lorries were passing along the road each way daily when the Burma Road was reopened in October, 1940. In the middle of January, 1941, about 160 lorries were on the move. By the spring food and munitions were piling up along the road and in warehouses because of the congestion caused by dozens of bottlenecks. General Chiang Kai-Shek cabled for help to the U.S.A. and this was immediately sent by air in the form of Mr. Daniel Arnstein, the owner of a fleet of 7,000 New York taxis and 8,000 lorries, and two of his business associates, Mr. Harold S. Davis and Mr. Marco Hellman, both of them experienced road vehicle operators. They quickly set to work to study the difficulties of the position, and made a report of recommendations within three weeks of their landing in Chungking. The General acted upon this immediately. The customs office on the Sino-Burmese frontier was ordered to remain open day and night instead of being closed at 6 every evening. An order was made concentrating the operation of lorries under one agency; which obviated delays for obtaining spare parts and effecting repairs. Entire columns of transport had often been halted out of neighbourliness while one man did repairs, and some drivers had lingered to drink and eat to a considerable extent. Instructions were therefore given that any delay of more than half an hour must be personally reported to General Chiang Kai-Shek. More than half the road is so narrow that it is one-way only, but by timing the lorries from each end of the road at the same hour each morning, unimpeded service was made possible for two-thirds of the total length of 726 miles. These and other reforms urged by Mr. Arnstein and his associates halved driving time and increased freight deliveries from 6,000 tons monthly to 15,000 Some indication of this progress was given in the report we published at page 454 of our October 31 issue, when we recorded that during August last some 4,000 lorries passed up from Lashio along the Burma Road, carrying supplies for China estimated at 10,000 tons.

At the time of Mr. Arnstein's investigation, out of a total of 2,887 Chinese Government lorries 1,407 were out of action, and the remainder were running on the most dangerous road in the world without a jack or spare tyre, carrying enough petrol to do the return trip and thereby reducing their freight capacity. As one engineer put it, the Burma Boad looks as if it had been scratched out of the mountains by the Chinese with their fingernails. At no point can the driver see more than an eighth of a mile ahead, and the highest permissible speed is 15 miles an hour. The road is 16 ft. at its widest, but for half its length it is only 9 ft. wide, and the swaying suspension bridges, which can take but one lorry at a time,

are even narrower. It is unpaved and has no guard rail of any kind and has sheer drops of from 1,000 to 7,000 ft. At least 1,300 vehicles are known to have come to grief over the edge.

When the Americans were conducting their inquiry, they found that half the traffic on the road was being run for the benefit of private traders who were making a highly lucrative business out of selling luxuries. This was altered by regulation, so that the first two loads of any private vehicle introduced to the service must be composed of government goods, the third petrol, and the fourth may then be private merchandise. One thing that seemed onerous to Mr. Arnstein was the Burmese transit tax, a cash-down levy of 1 per cent. on tonnage passing through Burma, which included millions of pounds' worth of Lease-Lend material in transit to China from the U.S.A. Often the money was not forthcoming and new vehicles containing thousands of tons of valuable freight were not permitted to continue on their journey. Arnstein's comment was prophetic : "It's a pity China is being penalised on this Lease-Lend freight when she is fighting an aggressor that may one day be at Burma's throat." Happily Washington and London agreed about the matter, and the tax on such transit goods was withdrawn.

When the work of diagnosis and recommendation was finished, the three Americans wished to return to the U.S.A., but General Chiang Kai-Shek invited them to remain and offered to place them in sole charge of the Burma Road traffic. They felt it was unfair to make money in this way, especially as the Chinese themselves could do the job, so, promising to return if their traffic system did not work, they went home. Thirty-five U.S.A. mechanics then went to China to man six dispatching and service stations on the road, and afterwards expert freight handlers followed to train the Chinese to take charge of the traffic arrangements. The story of this great achievement, from which some of these facts have been taken, was published in the December issue of *Asia* (New York). In view of the recent rapid development of the war in the Far East and of the United States entry into the war, this article is peculiarly apposite.

New Chinese Road-Surfacing Oil

After considerable experiment, the Free Chinese Government at Chungking is to use tung oil as a cheaper substitute for tar or asphalt for road and path surfacing.

Railway Gift from New Zealand

The Railway Benevolent Institution acknowledges with pleasure a cheque for £250 received through Mr. W. J. Jordan, the High Commissioner, as an appreciation by the railwaymen of New Zealand of the way in which British railwaymen have stood up to the demands which have been made on them by the war, especially from the air. The Hon. Robert Semple, the New Zealand Minister of Railways, sends his greetings to British railway workers and expresses his admiration of their work.

Sabotage in South Africa

Widespread explosions during the night of January 28-29 put out of action twelve main electric power lines supplying the Rand mines from Victoria Falls, but did not damage power stations, as at first reported. The explosions took place at Vereeniging, Witbank, Potchefstroom, Bronkhorstspruit, and Delmas. Railway telegraph wires were cut between Bronkhorstspruit and Middelburg, and at other places. Further sabotage occurred on February 2–3, The outrages are suspected to be the work of an anti-British organisation called the Ossewabrandwag (Ox Wagon Guard), corresponding to a Nazi Storm Troop division, which has repudiated any connection with the outrages, however. The South African Minister of Justice announced on January 29 that the Government intends to introduce the death penalty immediately for acts of sabotage.

South African Railway Employees for Military Auxiliary Hospitals

A scheme under which certain South African employees will be released for full-time voluntary work in military auxiliary hospitals was announced by Brigadier C. M. Hoffe, General Manager of Railways, at the annual meeting of the St. John Ambulance Association & Brigade, Railway District, of which he is the Commissioner. It has been decided to release for this duty members of the staff who have been members of the brigade for a long period and who are not eligible for service with the military nursing service. They will be granted pay at the rate of difference between their civil pay and the pay they would receive with the military nursing service (including ration allowance of 2s. a day) or the pay, if any, actually received for service in the auxiliary hospital, whichever of the two latter is the greater. Release for this duty will be in the discretion of the management and will not be granted in respect of employees engaged for the purpose of replacing members of the staff released for full-time military service.

Rapid Soviet Rail Repairs

In the rapidly-increasing territories regained by the Soviet Forces from the German invaders, an army of railway workers is following closely behind the troops in order to restore railway communications. In one instance, they are stated to have repaired more than 210 miles of track and 47 bridges near the front in less than a month. Loading and unloading facilities are being extended as speedily as possible, and on many lines normal traffic is already in operation.

The whole of the railway from the Donetz basin to Moscow has been re-opened for traffic, according to a message dated February 3 from the official Tass Agency. Trainloads of Donetz coal have already reached the factories in the Moscow region. Repairs to the track and the replacement of stations, bridges, and water supplies have been carried out in a remarkably short time, in face of great difficulties caused by exceptionally cold weather and snow storms.

Jamaica Transport Strike Ban

The Governor of Jamaica has issued an order under the Defence Regulations forbidding strikes and lock-outs in essential services, including transport, electricity, gas, and water, until at least a month after the board set up by the Government to inquire into general wage questions has reported.

Hungarian-Occupied Jugoslavia

The Hungarian State Railways have established a divisional headquarters (*direktion*) at Novi Sad, now renamed Ujvidek, for the operation of the railways in the territory seized from Jugoslavia.

Roumanian-Italian Rail Communication

Railway communication is to be reopened on April 1 between Roumania and Italy, *via* Hungary, Croatia, Germany, and Serbia, according to a Roumanian broadcast. The chairman of the Croatian Railway Commission is reported to have left for Rome, where negotiations will be conducted for direct communication between Italy and Albania through Croatia.

Passenger Service Restrictions in Sweden

As a result of the heavy demands on the railway services in Sweden in connection with the transport of wood fuel and other essential materials, temporary restrictions were imposed, limiting the number of special Christmas trains and sleeping cars.

Permanent restrictions, designed to limit the passenger traffic during the war, include the suspension of collective travelling as from December 15, 1941. Sunday return tickets have not been issued since December 28.

The Rail Link between Turkey and Bulgaria

Railway communication between Turkey and Bulgaria has been interrupted since the German invasion of Greece, and its resumption has been delayed time and again by war conditions and severe weather. Various dates for the opening of traffic have been announced by Berlin, the most recent saying that rail communication between Turkey and Bulgaria would be resumed on February 20, and that five trains would work daily between Istanbul and Svilengrad. This followed a statement from Ankara that bridges on this railway, which were demolished when the Germans invaded Greece last spring, were expected to be repaired by the Germans by the end of January. It was added that an agreement on railway problems had been reached at a meeting in Belgrade between Turkish and Bulgarian representatives, as a result of which a new frontier station was to be built at Svilengrad, where arrangements for the exchange of wagons would be made. Since then, however, the work of restoration has been retarded by severe weather conditions, and it is now stated by Vichy that the resumption of traffic has again been delayed for several months, as a bridge which German engineers had succeeded, after several weeks of hard work, in throwing across the Maritza River on the Turco-Bulgarian frontier, has been carried away by the flood water caused by a sudden thaw. This message was dated January 16. Subsequently (on January 25) another Vichy report said that the cold had become much more severe in Turkey and throughout the Black Sea basin, and that all communication between Turkey and Bulgaria was interrupted, the roads being blocked. Earlier references to the rail link were made in our issues of September 26 last (page 311) and November 14 (page 511).

The Zurich-Berlin Air Line

Since November 19, 1941, the Zurich-Munich-Berlin air line has been worked by the Swissair Company. According to official German notices, this is the only foreign company now operating air lines over German territory. Presumably Hungarian, Danish, and Finnish companies are not considered foreign.

South American Air Lines

The closure of the Italian L.A.T.I. air line between Italy and South America, under orders from the Brazilian Government, was announced on January 23. The Italian company extended its weekly European service from Rio de Janeiro to Buenos Aires on July 20 last, but recently this extension was withdrawn.

Argentina and Brazil have concluded an agreement to establish an air service between the two countries. Aircraft of the former German-controlled Condor Air Line, taken over by the Brazilian Government, will be used, according to Reuters. The Condor Air Line suspended all operations on December 16 last, as reported at page 103 of our January 16 issue.

Waste Paper Utilisation

Few persons realised what an important part paper and board played in the daily life of the community until the accute shortage occasioned by the present war. Before the war some 3¼ million tons of paper and board of various kinds were consumed in this country; of that amount 2¼ million tons were manufactured at home and a million tons were imported. For home production practically all the raw material was imported in the form of wood, wood pulp, and esparto grass.

Wood pulp came from Scandinavia and Finland and esparto from North Africa and Spain; when these sources of supply were cut off the paper industry was faced with the problem of producing from substitute materials. Although a certain amount of wood pulp is now imported from America, this is severely limited by shipping restrictions. With the spread of the war to the Pacific we must face the probability of a still further curtailment of wood pulp shipments, so that the need to make the maximum use of substitute materials is now of the utmost importance. The use of paper for all purposes is now drastically curtailed but a great quantity is still required as an essential part of our war production, for the packing of foodstuffs and for the maintenance of the life of the community.

Of the substitute materials available for paper and board manufacture the two most important are straw and waste paper. Straw has replaced the hitherto imported esparto grass, but the amount that can be used for papermaking is broadly limited by the equipment available for handling it, and for this reason the industry requires every scrap of waste paper and board that can be salvaged.

Recently we paid a visit to a large modern paper mill to inspect the methods of converting waste paper into fresh paper and board. Before the war this mill produced approximately 600 tons of high-grade printing and writing papers every week, for which it used some 750 tons of wood pulp and esparto and a small amount of rag. Today it uses only 100 tons weekly of wood pulp, straw has replaced esparto, and the use of rag has been greatly extended, but it is on waste paper that it is now very largely depending to make up its deficiency in materials.

A de-inking plant was built at the beginning of the war to repulp printed waste paper and this plant has been handling as much as 150 tons of waste paper weekly; unfortunately the amount available has recently become much less. The process of treating the waste paper is as follows: It comes into the mill already roughly graded by waste-paper merchants and is first sorted to remove obviously unsuitable material, some of which is passed on to board mills for making cardboard and so forth.

The paper is fed into a pulper in which it is disintegrated and treated with steam and caustic soda. This saponifies the chemical base of the printing ink so that it is released from the paper. The paper emerges from the pulper in the form of a thick greyish-coloured pulp and after standing for some hours it is diluted with water and run over sand tables where dirt and foreign matter are separated. Thence it passes through rotating filters which serve further to cleanse the pulp, after which it is bleached by chemical action. A good deal of the water is then removed by rotary vacuum filters and the pulp is ready for passing through the normal papermaking processes of beating and running on to the papermaking machine where it is converted to finished paper. The resulting product is an excellent substitute for pre-war papers made from virgin raw materials.

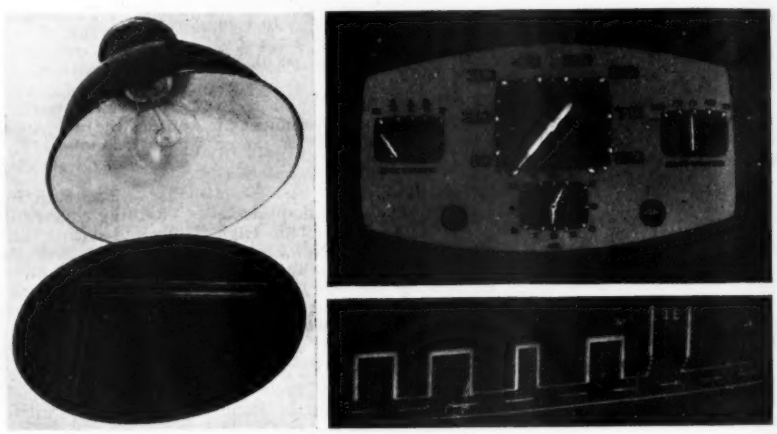
The visit showed clearly that every scrap of paper and cardboard has an extremely high value and that its preservation, collection, and utilisation is a vital national duty. By the sorting and grading of waste the best possible use is ensured; the selected grades of waste go to make high grade papers and boards which could otherwise only be made from imported raw materials and the lower grades go to board mills for conversion into material to make cartridge cases, shell cases, trench mortar carriers, and other munitions of war.

B.A.B. Fluorescent System of Lighting

In THE RAILWAY GAZETTE of February 6, at page 209, the use was noted of ultra-violet rays and a special type of fluorescent chalk in expediting the handling of war freights at L.M.S.R. marshalling yards. Recently we were afforded an opportunity of seeing at a demonstration in London a number of means to which the B.A.B. Fluorescent System of Lighting may be put. The B.A.B. system is the product of Colloidal Research Laboratories Limited, and has been introduced only recently to the commercial world. Already, however, it is stated to be attracting considerable attention, and it would appear to be useful for a number of transport purposes.

Illumination of fluorescent substance by rays of light within the ultra-violet region is not new, and in recent years has been used extensively in laboratory analysis. It is now possible and practicable, however, to use illumination of this kind on a much greater scale, and its successful use, of course, is made more valuable by reason of the blackout. The B.A.B. system consists of painting a surface, such as, for example, a curb, guide lines on the ground, projections from walls, or notices, with fluorescent paint and illuminating the subject from either a mercury vapour lamp or a white light lamp, from either of which the visible light has been filtered by means of specially designed "black glass" filters which transmit only certain wave-bands in the ultra-violet ends of the spectrum. The light itself is invisible and any light source may be used, such as car head lamps, ordinary tungsten filament lamps, searchlights, mercury vapour lamps, or high intensity gas lamps screened with the filters. The fluorescent material, for convenience, is supplied in the form of a high-grade lacquer. This is applied over a special white coating. The lacquer possesses hard-wearing qualities and rapid drying properties and it requires no protective varnish or other treatment. It will stand up to a good deal of abrasion without losing its fluorescence. The white under-coating can be applied to any surface—brick, concrete, wood, metal, or fabric. The fluorescent lacquer contains no pigment and it is claimed that it can be subjected to much harder usage than road marking paint without any damage to its fluorescent properties. An added advantage is that unlike luminescent paints, its fluorescent properties do not vary greatly with temperature.

The intensity of the fluorescence is governed by the amount of invisible radiation present, that is, given out by the filtered light, or the area of the surface treated. The intensity of fluorescence can be of the order of a light intensity as low as 0·1 ft. candles, with an increasing intensity up to, say, 100 ft. candles.



Left: Tungsten filament lamp and screen for ultra-violet emission. Right: Dashboard instruments treated with fluorescent paint and (below) a road and entrances to sheds similarly treated

ARGENTINE RAILWAYS PETITION TO GOVERNMENT. — Representatives of the Foreign Railways in Argentina have submitted a further memorandum to the Minister of Public works claiming relief from the disabilities which the companies suffer. It is pointed out that the annual provision for renewals is now little more than 10 per cent. of the total laid down by law. Exchange losses in 1941 totalled 24,209,000 pesos and the exchange margin between buying and selling rates imposes a tax equivalent to 15·3 per cent. on fund receipts used by the railways to meet financial services and 9·8 per cent. on the funds employed for the purchase of materials. The companies asked for sanction of the measures suggested in 1940 and 1941. These included the grant of a special rate of exchange and an increase in cattle and freight rates.

Parliamentary Notes

Bombay, Baroda & Central India Bill

The Bombay, Baroda & Central India Bill was presented to the House of Commons on February 3 and read a first time. The purpose of the Bill is " the winding up and dissolution of the Bombay, Baroda & Central India Railway Company, and giving effect to arrangements made with the Governor-General of India in Council."

Questions in Parliament

Below are summarised Answers to Questions in Parliament affecting transport. The Minister concerned and the date of the Answer are given in parentheses.

Producer-Gas Vehicles

Any large increase in the number of vehicles propelled by producer-gas must necessarily depend to a large extent on the quantities of suitable fuel available. As the House is aware, the Secretary for Mines recently appointed a committee, under the Chairmanship of Lord Henley, to report on this subject. The committee has made considerable progress, but the Secretary for Mines cannot anticipate its report. The whole question is engaging the close attention of the Government departments concerned. — (Mr. W. Whiteley, Comptroller of the Household, on behalf of Mr. D. R. Grenfell, Secretary for Mines, January 28.)

Petrol for Goods Vehicles

It has been decided to discontinue the issue of basic rations of motor fuel for goods vehicles with effect from March 7 next.—(Colonel J. J. Llewellin Joint Parliamentary Secretary, Ministry of War Transport, January 28.)

Restaurant Cars

Restaurant and kitchen cars have in the main been withdrawn to enable the seating capacity of heavily loaded trains to be increased to the maximum ; but, in some cases, withdrawal has been due to shortage of staff.—(Colonel J. J. Llewellin, January 29.)

Immobilisation of Motor Vehicles

The preparations against invasion include plans for the immobilisation of motor vehicles. Regional Commissioners are fully informed of these plans ; but it would not be in the national interest to publish in advance detailed information about the stages in which immobilisation would be applied to different areas and categories of vehicle.—(Mr. Herbert Morrison, Home Secretary, January 29.)

Motor Vehicle Repair Undertakings

In deciding whether a motor vehicle repair undertaking should be scheduled under the Essential Work Order, my Department acts in consultation with the Ministry of War Transport. Undertakings which wish to be scheduled may make application to the Regional Transport Commissioner. Due regard is paid to the present and potential importance of the undertaking, and, if necessary, it is inspected by the Ministry of War Transport. There is no formal right of appeal against a decision not to schedule, but the Minister of War Transport and I are prepared to consider representations from an aggrieved undertaking.—(Mr. Ernest Bevin, Minister of Labour & National Service, January 29.)

Sleeping Car Facilities

I am advised that sleeping accommodation on the trains between Glasgow and London could be increased only at the expense of reducing the seating accommodation or by the substitution of third class sleepers for first class sleepers. It was not the case that if trains were run slower there could be more sleepers. The problem was caused by a shortage of locomotive power. There were trains between London and Glasgow with as many coaches as the engines would take. (Colonel J. J. Llewellin, Parliamentary Secretary, Ministry of War, February 3.)

Belisha Beacons

The total amount of iron recoverable from the poles and metal globes of Belisha Beacons was approximately 1,000 tons and it would be comparatively costly to collect. So long, therefore, as other scrap was more readily obtainable it was not proposed to pull down these beacons. (Mr. G. Hicks, Parliamentary Secretary, Ministry of Works & Buildings, February 3.)

Hiring of Rugs and Pillows

Most of the rugs and pillows now in the possession of the railway companies are in use by railway Civil Defence personnel, Home Guards and staff on other essential wartime duties, and I regret that it is not possible to reintroduce the system of hire at stations. (Colonel J. J. Llewellin, February 4.)

Unused Tube Station

There is no access to the unused tube station, the " Old Bull & Bush " from the surface and it could not safely or conveniently be used as an air-raid shelter unless a shaft were sunk to give such access and to provide means of sewage disposal. The works involved would necessitate a considerable expenditure of labour, materials and money, and would, it is estimated, take at least a year to complete. Having regard to the general shelter position in London, I do not consider that it would be right to undertake this work. The station is being used by the London Passenger Transport Board for storage purposes. (Mr. Herbert Morrison, Home Secretary, February 4.)

Staff and Labour Matters

Railway Wages

The claim of the National Union of Railwaymen for a £3 minimum wage for railwaymen and the claim of the Railway Clerks' Association for improvements in the rates of pay of the lower classes of male salaried staff and female clerical staff, are to be heard by the Railway Staff National Tribunal on Monday, February 16. The chairman of the tribunal is Sir John Forster.

Road Passenger Transport Wages

The National Joint Industrial Council for the road passenger transport industry, which caters for the municipally-owned tramways, trolleybuses, and buses, has recommended that the following additions should be made to the war wage at present paid to employees whose wages are regulated by, or in accordance with, the decisions of the council :—

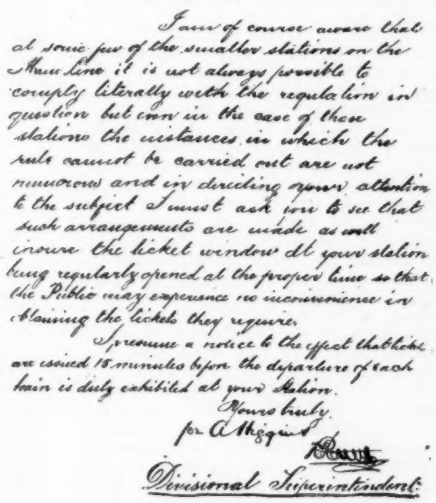
Adult male employees	4s. a week.
Male employees under 21 years of age	2s. a week.
Female employees ...	A proportion of the above amounts calculated in accordance with Industrial Court Award No. 1755.

The increases which are to apply from the first full pay period following February 1, 1942, bring the total war wage for adult male employees to 15s. a week.

Salving Waste Paper

The Great Western Railway Company, in common with other railway companies, is doing its full share in the nation-wide effort which is now being made to recover waste paper. Every department of the line is playing its part, both at headquarters and in the various divisional and district offices as well as at individual stations, large and small. Very successful results are being obtained, and documents, once of great importance, which have now outlived their usefulness, are among items of paper being scrapped. The headquarters of the various departments have contributed large quantities of waste paper in this way, but it is definitely a matter in which " every little helps."

A good many documents of more than passing interest are coming to light in this way, and in the current issue of the *Great Western Railway Magazine* is reproduced a portion of a multiplex handwritten circular on the long-standing instruction that booking-office windows shall be open to the public 15 minutes before the advertised departure time of trains. Other points of interest in the letter which we reproduce, are its excellent copperplate handwriting, and the signature of a former General Manager which it bears. Mr. F. Potter appears at the time in question (August 24, 1889) to have been chief clerk to Mr. A. Higgins, divisional superintendent of the London division. It will be remembered that he held the position of General Manager of the G.W.R. throughout the period of the last Great War, having been appointed in January, 1912. He died in July, 1919.



I am of course aware that at some few of the smaller stations on the Main Line it is not always possible to comply literally with the regulation in question but even in the case of these stations the instances in which the rule cannot be carried out are not numerous and in directing your attention to the subject I must ask you to see that such arrangements are made as will ensure the ticket window of your station being regularly opened at the proper time so that the Public may experience no inconvenience in obtaining the tickets they require.

I presume a notice to the effect that tickets are issued 15 minutes before the departure of each train is duly exhibited at your Station.

Yours truly,
for A. Higgins
Divisional Superintendent.

First Awards of L.N.E.R. Medal

The directors of the L.N.E.R. have approved the names of the first recipients of the L.N.E.R. Medal. As stated in our issue of July 11, 1941, this medal is to be awarded to those employees who show outstanding courage and resourcefulness in circumstances which, although not connected with enemy action, would, had they been so, have warranted recommendation for Government recognition.

Three awards, one of them posthumous, are to be made, namely—

Captain J. M. Stathers, Acting Dock

Master, Hartlepool, for high courage and resource in directing operations for the prevention of the capsizing and the successful refloating of a minesweeper on October 5, 1941.

W. Stewart, Dock Inspector, Methil, and *J. Lackie, Mason (Diver) Ladybank*, for outstanding qualities of courage and resource in a gallant attempt at rescue of Diver Grieve, who had become jammed in the sluice gates over the main sluice chamber of No. 2 dock gates at Methil Docks on August 26, 1941, and in which attempt Inspector Stewart lost his life.

Presentations of the medal will be made in the Board Room at York on February 19 next, after the meeting of the directors.

Lloyd's Medals for Bravery

PRESENTATION AT PADDINGTON

An interesting ceremony took place in the Chairman's Room at Paddington on February 4, when Sir Charles Hambro, K.B.E., M.C., presented to Second Engineer F. J. Purcell, M.B.E., Chief Radio Officer H. W. Campbell, M.B.E., and Stewardess H. M. Owen, G.M., Lloyd's War Medals for bravery which had been awarded by the Committee of Lloyd's in recognition of their bravery when the ss. *St. Patrick* was attacked by enemy aircraft in June last.

In making the presentation Sir Charles expressed great pleasure in being asked by Lloyd's to make these presentations to members of the company's staff, particularly as he knew the late Captain Faraday, who was Master of the vessel, and also because Miss Owen was the first woman on the staff of the Great Western Railway Company, if not on the staff of any of the main-line companies, to receive such a medal. In a felicitious speech, he also congratulated the recipients of the medals on the honour already bestowed on them by the King, and expressed great pride in the honour which their bravery had brought to the Great Western Railway Company.

Among those present at the ceremony were :—Lord Palmer, Sir James Milne, Mr. F. R. E. Davis, Mr. K. W. C. Grand, Mr. F. Weller, and a number of relatives and friends.

INSURANCE OF LIVESTOCK BY GOODS TRAIN.—The British railways have decided to continue for a further twelve months from February 1 the scheme which enables the owners of livestock, by the prepayment of a small premium, to insure their animals against death or injury during transit. The animals which may be insured, the premiums, and the insurable maximum values covered, are as follow :—

Animals	Premiums	Insurable maximum values
Horses and ponies ...	1s. a head	£50 a head
Cattle	1s. ,,	£25 ,,
Sheep and lambs ...	2½d. ,,	£3 ,,
Calves	1d. ,,	£2 ,,
Pigs (bacon)	3d. ,,	£6 ,,
,, (porker)	2d. ,,	£3 ,,

Minimum premium 2d. a consignment.

Alternative values and premiums have been arranged for cattle applicable only when written notice is given prior to commencement of transit :—

		Maximum value
Cattle	1s. 6d. a head	£37 10 0 a head
,, ...	2s. ,,	£50 0 0 ,,

The scheme does not cover war risks.

Notes and News

U.S. Revenue Freight.—Statistics issued by the American Railway Institute show that loadings of revenue freight for the week ended January 31 totalled 815,600 wagons.

Companies to be struck off Register.—It is announced in *The London Gazette* that the names of the following companies will, unless cause is shown to the contrary, be struck off the register at the expiration of three months from January 30 :—Cannon Street Station Catering Co. Ltd. ; Ebbw Vale Steel, Iron & Coal Co. Ltd. ; Smyrna International Ferry Service Limited.

Canadian Pacific Railway.—Gross earnings for December, 1941, were $21,204,000, an increase of $4,868,000, and expenses were $16,113,000, or $4,583,000 higher. Net earnings at $5,091,000 were $285,000 more than for December, 1940. For the whole year 1941 gross earnings were $221,446,000, an increase of $50,481,000, and the net earnings of $45,958,000 were $10,319,000 greater than those for the year 1940.

Great Southern Railways (Eire).—For the 4th week of 1942 the Great Southern Railways (Eire) reports passenger receipts of £29,782 (against £30,894), and goods receipts of £57,321 (against £48,456), making a total of £87,103, against £79,350 for the corresponding period of the previous year. The aggregate receipts to date are passenger £124,437 (against £126,615), goods £253,783 (against £197,473), making a total of £378,220 (against £324,088).

Home Grown Pitwood Transport Subsidy.—The Ministry of Supply states that as from February 8, 1942, home grown mining timber despatched from railway stations in the counties of Kent, Surrey, and Sussex will normally qualify for transport subsidy only if consigned to a coal mine in Kent, and that in certain circumstances special permission may be granted for transport to other coalfields on application being made to Ministry of Supply, Pitwood Department, Timber Control, Clifton Down Hotel, Bristol, 8.

Canadian National Railways.—Gross earnings for December, 1941, were $28,011,291 compared with $23,736,806 for December, 1940. Operating expenses were $21,750,841 (against $17,463,256) and net earnings were $6,260,450 (against $6,273,550). Aggregate gross earnings for the year 1941 were $304,376,778 (against $247,527,224 for the year 1940). The aggregate net earnings were $66,608,341 (against $45,007,412. For the 10 days ended January 31 the gross earnings were $9,687,000 (against $7,028,000). For the period of 1941 the aggregate gross earnings from January 1, to 31, were $25,967,000 (against $20,927,000).

E.P.T. and Depreciation of Machinery.—Captain Allan Kyle, Chairman & Managing Director of Jonas Woodhead & Sons Ltd., at the ordinary general meeting recently, said that he felt that insufficient regard was given by the Inland Revenue to allowances for depreciation of machinery and for obsolescence on its replacement which may by force of circumstances have to be postponed until E.P.T. was a thing of the past. Not only was plant and machinery being driven full out, but the normal periods of overhaul were, of necessity, much curtailed. Depreciation was, therefore, exceptionally severe, but it could not be said that these allowances have been proportionately increased. Further, an organisation which was straining every nerve to increase its production, was hamstrung by a completely static standard of profits. It was not desired to pay larger dividends, but rather to earn a reward for increased production to enable something to be put in the locker to replace a war-worn plant and to revitalise an organisation which might otherwise find itself winded not only financially but mechanically in the aftermath of the war.

The Institute of Transport.—On February 14 at 2.15 p.m. there will be a meeting of the Metropolitan Graduate & Student Society at the Institution of Electrical Engineers, Victoria Embankment, London, W.C.2, at which Mr. S. B.

British and Irish Railway Stocks and Shares

Stocks	Highest 1941	Lowest 1941	Prices Feb. 6, 1942	Prices Rise/Fall
G.W.R.				
Cons. Ord.	43½	30½	45	—
5% Con. Pref. ...	109½	83½	110½	—
5% Red. Pref. (1950)	105½	96½	106	—
4% Deb.	113½	102½	114½	—
4½% Deb.	115	105⅝	114½	—
4½% Deb.	121½	112	122½	—
5% Deb.	132	122	133	+ 2
2½% Deb.	70	62⅜	69	—
5% Rt. Charge ...	129½	116	129½	—
5% Cons. Guar. ...	128	110½	129½	—
L.M.S.R.				
Ord.	17½	11	18½	— ½
4% Pref. (1923) ...	53	33½	53	—
4% Pref.	68½	48½	70½	— ½
5% Red. Pref. (1955)	97½	77	95½	—
4% Deb.	105½	97	107	—
5% Red. Deb. (1952)	110½	106½	109½	—
4% Guar.	100	85½	101½	—
L.N.E.R.				
5% Pref. Ord. ...	3½	2½	3½	—
Def. Ord.	2	1½	2½	—
4% First Pref. ...	52½	33	52	—
4% Second Pref. ...	19½	10	20	—
5% Red. Pref. (1955)	79½	52	81	—
4% First Guar. ...	90½	74½	92½	—
4% Second Guar. ...	80½	59	82½	—
3½% Deb.	79½	68½	80	+ ½
4% Deb.	104	91½	105	—
5% Red. Deb. (1947)	106	102½	104	—
4½% Sinking Fund Red. Deb.	103½	99½	102½	—
SOUTHERN				
Pref. Ord.	65½	43½	64½	—
Def. Ord.	15⅝	9	16½	— ½
5% Pref.	107	77½	107½	—
5% Red Pref. (1964)	107	89½	107	—
5% Guar. Pref. ...	128	111	129½	—
5% Red. Guar. Pref. (1957)	114½	107½	114½	—
4% Deb.	112	102½	113½	—
5% Deb.	130½	119	133	—
4% Red. Deb. (1962–67)	108½	102	107½	—
4% Red Deb. (1970–80)	108½	102½	107½	—
FORTH BRIDGE				
4% Deb.	99½	90½	98½	—
4% Guar.	99	85½	100½	+ 2
L.P.T.B.				
4½% "A"	120½	109½	119½	—
5% "A"	130½	115½	129½	—
4½% "T.F.A." ...	103½	99½	100½	—
5% "B"	117	102	119½	—
"C"	46½	28½	40	—
MERSEY				
Ord.	24½	19½	22½	—
4% Perp. Deb. ...	100	90	99½	—
3% Perp. Deb. ...	73½	63	72½	—
3% Perp. Pref. ...	58	51½	57	—
IRELAND BELFAST & C.D.				
Ord.	4	4	4	—
G. NORTHERN				
Ord.	14½	3	14½	+ ½
G. SOUTHERN				
Ord.	14½	5	10½	—
Pref.	17	10	12	— ½
Guar.	44	16	42½	+ ½
Deb.	61	42	57	+ ½

OFFICIAL NOTICES

Official Notice

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is 9.30 a.m. on the preceding Friday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

WANTED

DIESEL RAILWAY TRACTION.—July 1940 to April 1941.—G. E. Stechert & Co., 2, Star Yard, London, W.C.2.

Budworth, A.M.Inst.T., will read a paper on "The Problem of Post-War Transport." Mr. C. F. King, M.Inst.T., Traffic Manager of Bryant & May Limited, will give the opening address at the informal meeting to be held on February 24 at 1.15 p.m. at the Institution of Electrical Engineers, Victoria Embankment, London, W.C.2. His subject will be "Co-Partnership and the Transport Industry." Buffet lunch (1s. 6d.) available at 12.45 p.m.

Road Motors of the U.S.A. Railways.—Recently-issued statistics applying to January 1, 1941, show that the U.S.A. railways then had 72,000 road transport vehicles in operation under their own direct ownership. In addition, road motor vehicles owned by the Railway Express Agency totalled 14,000. These figures are, of course, exclusive of railway interests through shareholdings in road transport companies.

Control of Timber Order.—The Minister of Supply has made the Control of Timber (No. 23) Order, effective from February 9, 1942. This Order provides new maximum prices and selling conditions for: (1) home-grown telegraph and transmission poles, and (2) home-grown sleepers and crossing timbers. The object is to encourage producton of poles, and particularly sleepers, suitable for use on the main lines of railways.

Province of Santa Fe French Railway Company.—The River Plate Trust Loan & Agency Limited announces that it has now received the necessary funds to pay the half-yearly coupons due January 1, 1942, on the 3 per cent. mortgage obligations of the French Railways Company of the Province of Santa Fe and to repay the bonds drawn for repayment at par on or after that date. Coupons due January 1, 1941, were paid last September.

New Loudspeakers at York Station.—A new type of loudspeaker has been installed at York station to enable announcements to be made with greater clarity, and 112 of these replace 12 of the older type. They are placed on the principal platforms, the footbridge, and main square. As they are only 45 ft. apart, passengers are never out of earshot. Shortly they will be placed in the refreshment rooms also, an innovation which will be helpful to passenger and station staff alike.

Partington Steel & Iron Co. Ltd.—At an extraordinary general meeting of this company held on January 29 a special resolution was passed to the effect that the company be wound up voluntarily as a members' voluntary winding-up, and that Mr. Thomas Lister, of Granite House, Cannon Street, E.C.4, Chartered Accountant, be appointed liquidator. The directors of the Partington Company recently announced the sale of 899,102 "A" ordinary shares which it held in the Lancashire Steel Corporation.

Leopoldino Railway Moratorium.—Meetings have been convened for February 10 to consider a five years' extension from December 31 last of the moratoria affecting the £4,793,774 4 per cent. first debenture stock, the £723,900 of 6½ per cent. terminable debentures and the £64,389 of severed coupons for interest in arrear on the terminal debentures of the Leopoldina Railway Co. Ltd., and the £893,800 of 5 per cent. first debentures of the Leopoldina Terminal Co. Ltd.

The Cowlairs Accident, L.N.E.R.—The death roll from this collision, of which brief details were given in our issue last week, has now risen to 14; another person has died in hospital. Colonel A. C. Trench opened the formal inquiry at Glasgow on February 9, on behalf of the Minister of War Transport. The inquiry is being continued in private.

L.N.E.R. Palace Hotel, Aberdeen.—Sheriff Principal Sir George Morton, K.C., gave his findings at Aberdeen on February 6, after a three days enquiry into the circumstances which surrounded the death of six women employees, who as recorded in THE RAILWAY GAZETTE of November 7, lost their lives in a fire at the hotel on the night of October 30, 1941. The Sheriff Principal found that their deaths were due to the effects of fire which destroyed part of the hotel. The fire originated in the grill service-room, but the evidence was insufficient to establish its cause. The Sheriff Principal added that he entirely agreed with what had been said during the enquiry by Mr. A. M. M. Williamson, advocate, Edinburgh, who appeared for the L.N.E.R., as to the gallantry and commendable activity of certain members of the hotel staff on the night of the fire.

Railway and Other Reports

Great Southern Railways (Eire).—The directors have decided to pay arrears of dividend on the 4 per cent. guaranteed preference stock for the three years 1938, 1939 and 1940. No dividend is forthcoming on the ordinary sotck.

Manx Electric Railway Co. Ltd.—Gross receipts for the year to September 30, 1941, were £12,619 (against £5,657). Gross expenditure was £12,657 (against £13,006), leaving debit £38 (against debit £7,349), plus £17,445 brought in, making a debit forward of £17,482.

Central Bahia Railway Trust Co. Ltd.—The trustees have declared for the year to January 31, 1942, interest on the "A" certificates at 15s. per cent., less tax, payable on February 14. A year ago interest of 10s. 6d., less tax, was paid for the four years to January 31, 1941. The trust holds £1,023,300 Brazil 4 per cent. rescission bonds out of £1,135,000 bonds received in respect of the sale in 1902 of the Central Bahia Railway undertaking; the balance of £111,700 bonds have been sold by the trustees.

Taltal Railway Co. Ltd.—For the year ended June 30, 1941, gross receipts were £32,610, an increase of £3,019, or 10·20 per cent., as compared with 1939-40. Working expenses at £47,236 were £7,535, or 18·98 per cent. higher, and loss on working was £14,625, against £10,110. Adding interest and sundry credits to the £3,799 brought forward, leave as debit balance to be carried forward of £5,811. Number of passengers rose from 6,280 to 7,512, or 19·62 per cent., and the tonnage of goods was 63,775, against 61,287, an increase of 4·06 per cent. The principal factor in the increased receipts was the improvement in the amount of traffic for the nitrate oficinas. Higher costs are largely due to the burdens imposed by recent social legislation.

State of Bahia South Western Railway Co. Ltd.—Gross receipts for the year to April 30, 1941, were £32,769 (£31,947), and working expenses were £30,934 (£30,186), leaving net receipts £1,835 (£1,761). Net revenue was insufficient to meet the service of the 8 per cent. prior lien debenture stock. No payments on account of interest were made during the year. The moratorium which expired on October 31, 1941, has been extended for one year.

Thomas Tilling Limited.—Net profit for the year 1941 is £524,496, against £519,194 for the previous year; figures are struck after provision for taxation and depreciation. Final dividend on the ordinary is again 5 per cent., less tax, making 10 per cent. (same) for the year.

United Service Transport Co. Ltd.—Net profit to September 30, 1941, was £22,917 (against £16,661), less £9,366 (against £6,907) to depreciation. War damage contribution took £3,781 (against nil). The preference dividend was again 10 per cent. and the ordinary dividend was again 13·614 per cent., and £101 (against £295) was carried forward.

Central Wagon Co. Ltd.—After depreciation, taxation, and war damage contribution, net profit to September 30, 1941, was £63,771 (against £87,416). Final dividend is 9½ per cent. again, making 12½ per cent., less tax. There is placed to reserve £25,000 (against £45,000), and £25,350 (£17,829) is carried forward.

Associated Equipment Co. Ltd.—Trading profit for the year to September 30, 1941, was £789,831, against £710,309 for the previous year. Other income was £9,746 (£15,342), including £7,852 profit on realisation of investments, giving a total of £799,577 (against £725,651). Tax takes £560,000 (against £421,500). A final dividend is again 1s. per £1 stock unit, tax free, making a total of 1s. 6d., or 7½ per cent. net for the year (same); £18,000 is placed to reserve (against £82,000) and £268,000 is carried forward (£266,000).

Contracts and Tenders

The Canadian National Railway Company has authorised the purchase of 415 40-ton box wagons.

On and after February 16 orders placed with the electric cable industry for wires, cables, or flexible cords, insulated with rubber or with substitutes for rubber, must be accompanied by a certificate obtainable from the supplier to the effect that the whole of the material specified therein is required for essential national purposes.

Railway Stock Market

Stock Exchange markets have been overshadowed by war influences, and at the time of writing, further contraction in the volume of business has been reflected by slightly lower levels for security values. Despite the large amount of money that will be seeking investment, British Funds have been affected to some extent by the surrounding trend of markets; as in other directions, the main factor was the reduced demand in evidence, selling in all sections of the stock and share markets having remained on a very small scale. As was to be expected, home railway securities have been unable to move against the general tendency at the time of writing, and movements in prices have been irregular. Various prior charges were again better on balance, but junior issues have reacted slightly; the disposition is to await next week's dividend announcements. Most of the debentures have been in increased demand in recent months and are now not easy to obtain in large amounts. Consequently the tendency has been for investment demand to centre more on the guaranteed stocks of the L.N.E.R. and L.M.S.R. L.N.E.R. second guaranteed, despite its further improvement, yields 4¾ per cent., and in respect of 1940 interest requirements were earned four times over. In the case of L.M.S.R. guaranteed, which yields nearly 4 per cent., the cover for interest requirements is very substantial, and there is, of course, no question of the high investment merits of this stock. Moreover, so long as future air raid damage is not extremely heavy, the financial agreement with the Government will assure that senior preference stocks should continue to receive their full dividend payments during the period of the war; and substantial yields are obtainable on L.N.E.R. first preference and also on L.M.S.R. senior and 1923 preference issues. Now the guaranteed stocks are in smaller supply, investment demand for these preference stocks may show gradual expansion. It is expected the home railway dividend announcements will be made on the following dates: L.M.S.R., February 18; Southern and London Transport, February 19; Great Western and L.N.E.R., February 20. Argentine railway securities have remained inactive, and were unresponsive to the news that the companies have approached the Argentine authorities for relief from the exchange and other disabilities under which they are working. On the other hand, Brazilian railway stocks have been firmer; sentiment has continued to be assisted by the announcement of payment of a year's interest arrears on Great Western of Brazil 6 per cent. and 4 per cent. debentures. Leopoldina debentures recovered part of their recent decline.

Compared with a week ago, Great Western ordinary stock has moved back from 44⅞ to 44½ at the time of writing. On the other hand, the 5 per cent. preference was again 110¼, and the debentures were maintained at 114½. L.M.S.R. ordinary moved back from 18⅝ to 18½, while the 1923 preference was fractionally lower at 53, although the senior preference remained at 71. This railway's guaranteed stock continued in request and at 102½ showed a further small gain on balance. L.N.E.R. guaranteed issues were also favoured; the firsts were higher at 93, and the seconds were maintained at 83½. L.N.E.R. first and second preference were fractionally lower at 52 and 19¾ respectively. This railway's 3 per cent. and 4 per cent. debentures held their recent gains to 79⅛ and 105 respectively. There was further profit-taking in Southern deferred, which has moved back to 16⅛, compared with 16⅝ a week ago. Southern preferred was lower at 63½, but the 5 per cent. preference was fractionally higher at 108, while the guaranteed stock was again 129½, and the debentures 114½. London Transport "C" was 40½, compared with 40¾ a week ago.

Where changed, Argentine railway stocks were slightly lower on balance. Among Brazilian issues, Great Western of Brazil 6 per cent. debentures rose to 51 and the 4 per cent. debentures to 43. B.A. Western issues improved, and Leopoldina debentures showed a partial rally. Canadian Pacific appear to have developed a firmer tendency at the time of writing.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1941-42	Week Ending	Traffic for Week: Total this year	Traffic for Week: Inc. or Dec. compared with 1941	No. of Weeks	Aggregate Traffics to date: Totals: This Year	Aggregate Traffics to date: Totals: Last Year	Aggregate Traffics to date: Increase or Decrease	Shares or Stock	Prices: Highest 1941	Prices: Lowest 1941	Prices: Feb. 6 1942	Yields% (See Notes)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	1.2.42	20,810	+ 1,270	5	102,450	87,590	+ 14,860	Ord. Stk.	10¾	3¼	10¼	Nil
	Argentine North Eastern ...	753	31.1.42	ps. 135,100	+ ps. 26,300	31	ps. 5,624,900	ps. 4,755,700	+ ps. 869,200	,,	4	1	3¼	Nil
	Bolivar	174	Jan.,1942	4,960	+ 1,760	5	4,960	3,200	+ 1,760	6 p.c. Deb.	5	5	7	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds	8	2½	10	Nil
	Buenos Ayres & Pacifi ...	2,801	31.1.42	ps.1,740,000	— ps.45,000	31	ps.41,908,000	ps. 38,658,000	+ ps.3,250,000	Ord. Stk.	7¾	1½	6	Nil
	Buenos Ayres Great Southern	5,082	31.1.42	ps.2,962,000	+ ps.257,000	31	ps.71,774,000	ps.62,759,000	+ ps.9,015,000	Ord. Stk.	10¾	3¼	9½	Nil
	Buenos Ayres Western ...	1,930	31.1.42	ps.1,302,000	+ ps.342,000	31	ps.26,198,000	ps.21,640,000	+ ps.4,558,000	,,	9	2½	8½	Nil
	Central Argentine	3,700	31.1.42	ps. 1,809,100	+ ps. 34,350	31	ps.54,536,350	ps. 44,277,150	+ ps.10,259,200	,,	8¼	2½	6½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	2½	½	3	Nil
	Cent. Uruguay of M. Video...	972	24.1.42	ps. 23,802	— 3,513	30	685,678	632,150	+ 53,528	Ord. Stk.	9¼	1	6½	Nil
	Costa Rica	188	Dec., 1941	21,753	— 2,770	26	135 989	118.038	+ 17 951	Stk.	15½	11¼	13½	14½
	Dorada	70	Dec., 1941	12,840	+ 540	52	148 870	146,500	+ 2,370	1 Mt. Db.	97	97	90½	6½
	Entre Rios	808	31.1.42	ps.234,800	+ ps.27,500	31	ps. 8,158,600	ps. 6,759,100	+ ps.1,399 500	Ord. Stk.	6½	½	7	Nil
	Great Western of Brazil ...	1,030	31.1.42	13,300	+ 800	5	57,800	56,300	+ 1,500	Ord. Sh.	11/-	1/-	⅜	Nil
	International of Cl. Amer. ...	794	Dec.,1941	$519,619	+ $73,379	52	$5,617,278	$5,544,439	— $72,839	—	—	—	—	—
	Interoceanic of Mexico ...	—	—	—	—	—	—	—	—	1st Pref	⅜	6d.	½	Nil
	La Guaira & Caracas... ...	22½	Jan.,1942	6,430	+ 305	5	6.430	6,125	+ 305	—	—	—	—	—
	Leopoldina	1,918	31.1.42	38,428	+ 10,628	5	133,143	107.542	+ 25,601	Ord. Stk.	4¾	½	4½	Nil
	Mexican	483	31.1.42	ps. 532.900	+ ps.56,800	5	ps. 1,419,300	ps. 1,310,200	+ ps.109,100	,,	⅜	¼	1	Nil
	Midland of Uruguay ...	319	Nov.,1941	12.157	+ 975	22	66,948	57.186	+ 9,762	—	—	—	—	—
	Nitrate	386	31.1.42	5.563	— 142	5	11,036	10.252	+ 784	Ord Sh.	66/-	1¼	3⅞	3½
	Paraguay Central	274	31.1.42	$3,079,000	— $682,000	31	$106,622,000	$103,172,000	+ $3,450,000	Pr. Lt. Stk.	43½	29	42½	7⅛
	Peruvian Corporation ...	1,059	Jan , 1942	80.429	+ 12,609	31	512,971	461.145	+ 51,826	Pref.	6⅜	1¼	9	Nil
	Salvador	100	Dec ,1941	c117,000	+ c32,000	26	c361.172	c 288 683	+ c72.489	—	—	—	—	—
	San Paulo	153½	25.1.42	36,875	+ 1.438	4	114,250	124,054	— 9,804	Ord. Stk.	52	24½	46	4½
	Taltal	160	Dec , 1941	2.430	— 775	26	27,760	17,140	+ 10,620	Ord. Sh.	1½	6/-	1⅛	Nil
	United of Havana	1,346	31 1.42	25,390	— 776	31	605,263	482,835	+ 122,428	Ord. Stk.	2⅛	¼	3½	Nil
	Uruguay Northern	73	Nov ,1941	1,294	— 62	22	6,686	5,631	+ 1,055	—	—	—	—	—
Canada	Canadian National	23,560	31 1.42	1,937,400	+ 531,800	5	5,193,400	4,185,400	+ 1,008,000	—	—	—	—	—
	Canadian Northern ...	—	—	—	—	—	—	—	—	Perp. Dbs.	94⅞	85½	—	—
	Grand Trunk	—	—	—	—	—	—	—	—	4 p c. Gr.	104⅞	99½	—	—
	Canadian Pacific	17,137	31.1.42	1,425 400	+ 432,600	5	3,732,000	2,937,000	+ 795,000	Ord. Stk.	13	7⅛	12	Nil
India†	Barsi Light	202	20.11.41	3,780	+ 375	32	111,547	102,105	+ 9,442	—	—	—	—	—
	Bengal & North Western ...	2 099	Dec., 1941	295.575	+ 52,505	13	824,100	757,001	+ 67,099	Ord. Stk.	345	253	341½	4⅜
	Bengal-Nagpur	3,269	10.10 41	234 750	— 14.924	27	4,993,938	4,533,077	+ 460.861	,,	101¼	95⅜	100½	4
	Bombay, Baroda & Cl. India	2,986	31.12.41	369.750	+ 36,300	39	8,119,875	7.440,150	+ 679,725	,,	98½	92	99½	6
	Madras & Southern Mahratta	2,939	20 11.41	195,600	+ 32,014	32	4,595.895	3,817,454	+ 778,441	,,	105⅞	101¼	102½	7⅛
	Rohilkund & Kumaon ...	571	Dec.,1941	56 550	— 639	13	153,825	153 064	+ 761	,,	342	290	342	4⅜
	South Indian	2,402	30.11.41	140,022	+ 23,628	34	3,528,581	3,037,730	+ 490,851	,,	100	87	99½	3½
Various	Beira	204	Oct.,1941	82,103	—	4	82.103	—	—	—	—	—	—	—
	Egyptian Delta	610	31.10.41	11,565	+ 1,176	29	168,612	117,730	+ 50,882	Prf. Sh.	1½	29/-	2½	Nil
	Manila	—	—	—	—	—	—	—	—	B. Deb	68	45	50	7
	Midland of W. Australia ...	277	July, 1941	18.648	+ 7,251	4	18,648	11.397	+ 7.251	Inc. Deb.	90½	85½	89½	6⅜
	Nigerian	1,900	25 10.41	41,081	+ 9.811	30	1,483,406	1,059,899	+ 423,507	—	—	—	—	—
	Rhodesia	2,442	Oct., 1941	482.053	—	4	482,053	—	—	—	—	—	—	—
	South Africa	13,291	13.12.41	819.771	+ 38,698	37	28,186,661	25,391,031	+ 2,795.630	—	—	—	—	—
	Victoria	4,774	Sept. .941	1,052,397	+ 161,210	13	3,053,542	2,648,904	+ 404,638	—	—	—	—	—

Note. Yields are based on the approximate current prices and are within a fraction of ⅛ Argentine traffics are given in pesos
† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend